The Earth Science DIGEST

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January - February, 1954

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AN EARTH SCIENCE ENTHUSIAST

by James O. Montague

After one has been married for a number of years, reached middle life, and is the parent of grown children, it would seem foolish even to entertain the thought of going to college and much more foolish to secure a Masters Degree. Not so with Mrs. Mildred Recht a member of the Wisconsin Geological Society, Milwaukee, Wisconsin. She has accomplished all of that and much more.

Mrs. Recht attended Manitowoc County Normal School, Manitowoc, Wisconsin, for one year and then taught country school for four years. She quit teaching to marry George Recht and they became the parents of two fine children, Millie and George Jr. Mrs. Recht spent sixteen years in industry in Milwaukee. During all these years she had a longing to return to teaching but Wisconsin laws required more schooling than she had in order to do this. Finally when George Jr. was in High School and daughter Millie was attending Milwaukee-Downer College, Mrs. Recht decided to go to college herself, and she did that very thing by enrolling in Milwaukee State Teachers College (now Wisconsin State College) completed the four year course in two and one-half years, securing her Bachelors Degree in 1946. She did not stop here but secured her Masters Degree in June, 1951. She has also taught school for the past seven years.

While attending Milwaukee State Teachers College, Mrs. Recht took a course in geology. She heard about the Wisconsin Geological Society, attended one of its meetings and became a member. She interested her class of 5th graders in rocks and the kids went for them just like a duck goes for water. It was not long until they were bring-

An Earth Science Enthusiast: Mrs. Mildred Recht, School Teacher Extraordinary, who makes Earth Science a real inspiration to her young pupils.

ing in all kinds of stones for her to identify. However, she always kept the situation well in hand and began to build up a real display of the different types of rocks, minerals and fossils, in her room at Riverdale School, Glendale, a suburb of Milwaukee.

It takes a lot of time, travel, and hard work to assemble a collection of rocks and minerals. Mrs. Recht was at a great disadvantage in doing this, not owning a car, but her friends in the W. G. S. saw that she had a means of transportation when field trips were held. They were also very generous in contributing material both from home and abroad to her school collection. She has also purchased and traded for many specimens.

Mrs. Recht has pioneered Earth Science teaching in her school and is receiving much commendation from her superiors on the accomplished results. There is a bright future ahead of her and she will not be content until she sees this type of teaching well established in the Public Schools. The Wisconsin Geological Society is proud to have her as a member and is encouraging her in every way possible to achieve greater success in her chosen field of work.

THE POP-CORN MINERAL

Perlite, the unique, so-called popcorn mineral, is one of the most surprising actors in the entire mineral kingdom. Being a highly hydrated variety of volcanic lava, it expands with almost explosive force when brought quickly under high temperatures, between 1600 and 1700 degrees Fahrenheit.

It is found in a number of localities in our western mountains, but some of the best deposits are located near Lovelock, Nevada, and Grants, New Mexico. A carload of crushed raw perlite when expanded, produces between 10 and 12 carloads of the plaster making aggregate, and a cubic foot of the expanded pellets may weigh as little as two pounds. Almost unbelievable, but this is true nevertheless.

MEET THE AUTHOR

P. A. SAUVAN, Author,
Importance of Rhythmic Features in Geology.
Ing. Geol., Nancy (France)

COVER PHOTO

Our January cover photo, in keeping with our feature article "Importance of Rhythm," a contribution from our sister Republic of France, is a view of the 'Sun drawing (?) water' over the Bay of Biscay (Golfe de Gascogne), taken from land's point at Biarritz, France—said to be one of the most picturesque and romantic spots in all Europe.

Biarritz was the seat of the temporary American Army University established immediately following the close of World War II, for the benefit of the American soldiers stationed in Europe, and the photo was contributed by Ben Hur Wilson, Jr., while he was a student of the University in 1945.

IMPORTANCE OF RHYTHMIC FEATURES IN GEOLOGY*

P. A. SAUVAN, Ing. Geol., Nancy (France)

ABSTRACT

This is a study of general points on evolution rhythms of elements, of rocks, fauna and flora and the interactions of one to another.

The rhythms which we usually think of occur at very different scale to the rhythms which can be observed in the Earth history. One can only give a pattern of their probable figures and only the knowledge of all the records actually unknown could give an exact idea of them.

Furthermore it is difficult to discriminate the interactions of the cyclic phenomena ones under the others. They are certain in many cases; for instance NEWELL, in the field of paleontology tried to explain the rhythms of the faunal evolution by rhythms in the climatical and physical conditions of living, but he does not assert any precise relation, because lack of details in paleontology and paleogeography. The same observations can be taken for all the other interactions.

There are many fields in Earth's Sciences in which occurs undoubtedly particular rhythm:

1. Evolution of chemical elements.
2. Evolution of composings of rocks.
3. Evolution of orogenic movements.
4. Evolution of fauna and flora.
5. Evolution of climatical conditions on the surface of the Earth.

1. Cycle of chemical elements

Through the history of the Earth the chemical elements evolute going through several phases which are refound at times: Na and K for example occurring in many minerals of crystalline rocks and volcanic rocks as micas and feldspars, is generally separated by weathering of the other elements, and is carried in solution by running water. Afterward it can be deposited in seas or lagoons (I) under form of chlorides, sulfates and carbonates, and takes his place in the sedimentary series by such process. In other cases it occurs frequently that it becomes incorporated in clays minerals which are called "neoformated."

Iron on the other hand is found specially in the basic (or "mafic") minerals of crystalline rocks, micas, pyroxenes, amphiboles and olivine. It is mainly carried out of ground by volcanic intrusions, and then removed by water and redeposited under form of sedimentary iron-ore, except when it undergoes any special process (lateritisation, pyritisation, etc. . . .). This latter case is specially important in continental deposits (in old deserts as in the "Rothliegende" of Germany).

All these deposits of different issues returns during the orogenic movements to the "igneous" part of the Earth crust by the fact of metamorphic process (migmatisation, granitisation).

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*Editors Note: We are exceedingly gratified on being able to present this outstanding and thought provocative paper by our over-seas colleague, not only on account of its singular merits, but as a gesture encouraging a better understanding of the scholarly efforts being made by the geologists of our great sister Republic of France. We salute them. In the presentation of this paper we have purposely avoided making any changes or interpolations in the original manuscript. We leave it to our readers to make their own translation into our Anglo-American vernacular. —B.H.W.

Paleolithic age, that of earliest known human oreciture, represented by the use of unpolished stone implements

Neolithic age, - following, much shorter period characterized by the use of better implements of stone, bone, & horn, by the beginning of agriculture and use of domestic animals

II. Cycles of sedimentation and weathering

There is a certain number of series containing types of sediments which are found approximately always in same order and among which may be distinguished, according to GOLDSCHMIDT and others:

1. Quartz and heavy minerals of crystalline rocks: grits, conglomerates, sandstones, zircon, rutile, etc. . . .
2. "Hydrolysates": shales, bauxites, clays.
3. "Oxydates": sedimentary iron and manganese.
4. Carbonates: limestones and dolomites.
5. Salt rocks: gypsum, ClNa, ClK, SO^4Na^2, etc. . . .

(I) in french: "lagunes."

Example: German-French Basin of sedimentation during the Trias:

Conglomerates:	"Hauptkonglomerat"	LOWER TRIAS
Grit and standstones:	"Gres vosgien"	
Clays and shales:	"Lettenkohle"	MIDDLE TRIAS
Limestones:	"Muschelkalk"	
Salt rocks	"Keuper"	UPPER TRIAS

Examples of this sort are numerous in each geological province; in other words, in each basin of sedimentation. But one or the other term of this series can be lacking (in this example the oxydates).

An other observation of the same sort can be made on world-wide facies: it occurs any periodicity in the great world-wide or continent-wide types of sedimentation: in major cases, rocks of Silurian and Liasic ages are shales and slates. Type of sedimentation in Cambrian, Devonian and Permo-triassic rocks is predominately sandstones and quartzite. Oxydates are not represented in this world-wide scale in any geological period except the great series of Old, Middle and New Red Sandstones in Western Europe, which includes both types (1) and (3) of sedimentation precedently enumerated. Salt formations: Trias and Tertiary are known as saliferous ones in major part of Europe and Near Orient.

III. Cycles of orogenic movements and granitisations (fig. 1)

There are a certain number of orogenes and granitisations through the ages on the surface of the Earth: they are distinct in time and amplitude, but the same province may be affected by several phases of different ages. The Precambrian ones are not well known because weathering and be-

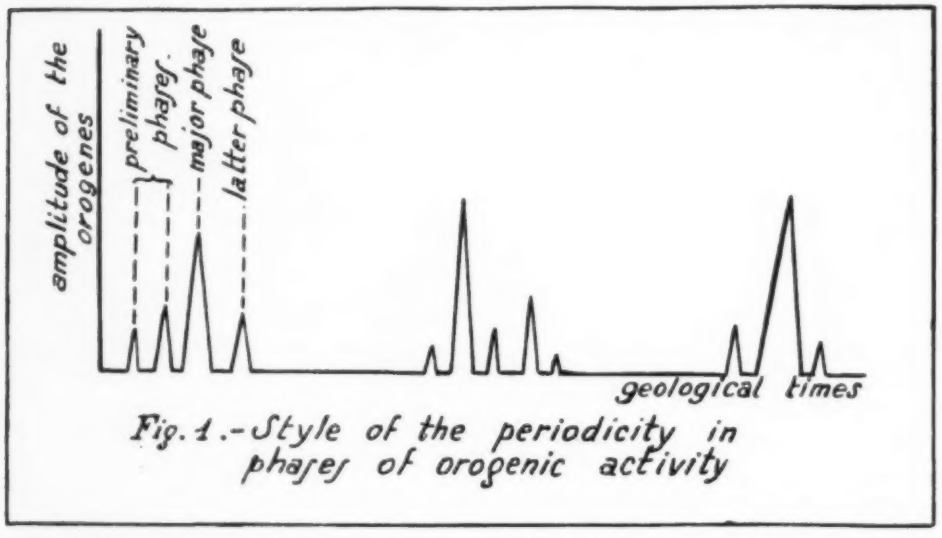


Fig. 1.- Style of the periodicity in phases of orogenic activity

SECTION OF GEOLOGICAL MUSEUM, SCHOOL OF ENGINEERING, NANCY, FRANCE. (PHOTO—CHARLES ANDRE)

cause the effects of granitisations of latter ages.

Afterward we may distinguish:

—Cambrian granitisation and orogenes
—Permo-Carboniferous and orogenes (Harz)
—Jurassic granitisation and orogenes
—Cretaceous granitisation and orogenes (Andes)
—Tertiary granitisation and orogenes (Alpes)

IV. Periodicity in Paleontological Evolution

Cyclic features are known by paleontological statistical studies: Graphs were obtained specially by SIMPSON & NEWELL by report of the number of genera in an order or family in function of number of millions of years appreciated by different methods. These graphs show many rhythms in the development of the fossil fauna:

1.—Rapid changes in the rates of biological evolutions seem to occur at times in the Earth history; for instance, Devonian, Trias and Tertiary periods are paleontologically well marked by extinction of a great number of older invertebrate genera; and by birth of new genera but less than in the other periods. Changes are sensibly contemporaneous for a great number of fossil genera and orders (predominately for the Invertebrates).

2.—There is some similarity in evolution curves of many groups, due to known or unknown geological features.

A second sort of periodicity is the periodicity in a same class or order; for instance the Brachiopoda:

Orders RHYNCHONELLACEA and TEREBRATULACEA rise two successive maxima on Devonian and Jurassic. Order PRODUCTACEA rises two maxima on the Mississippian and the Permian periods.

V. Cycles of climatical conditions on the surface of the Earth

Climatical features are the most complex ones of the geological features which can

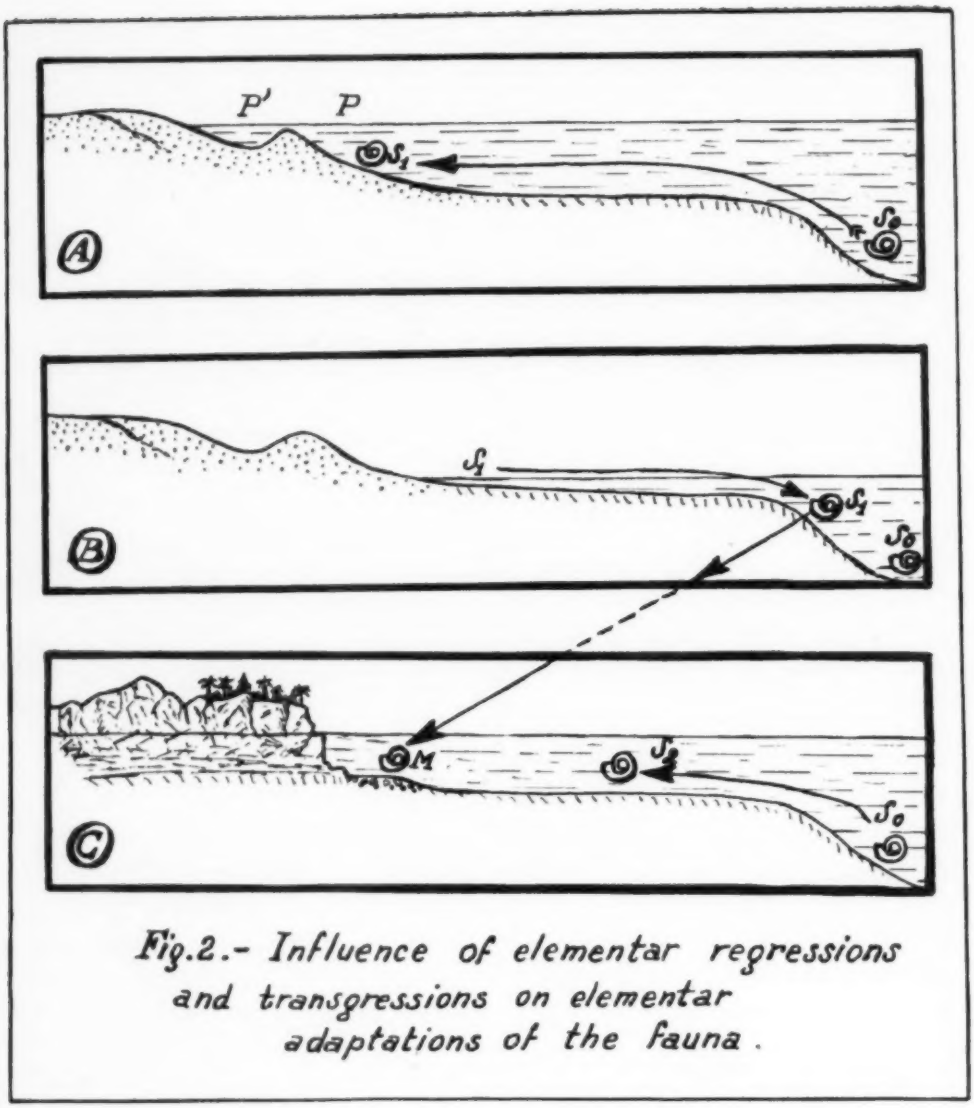


Fig.2.- Influence of elementar regressions and transgressions on elementar adaptations of the fauna.

be studied; all interpretations and correlation of the records of physical stratigraphy, paleontology and sedimentary petrology are very difficult in details.

But in whole we can describe many periodic phenomen through the Earth history:

—Periods of glaciation in parts of the surface of the Earth ("tillites", "warves", etc. . . .).

—Periods of desertic climaxes.

—Changes in direction and amplitude of marine currents.

—Change in composition of the Earth atmosphere.

INTERACTIONS OF RHYTHMS OR PERIODICITIES (fig. 3)

(Designations here used:)

(1) Evolution of chemical elements.

(2) Evolution and cycles of composings of rocks.

(3) Evolution of orogenic movements.

(4) Evolution of fauna and flora.

(5) Evolution of climatical conditions on the surface of the Earth.

Influence of (2), (3) and (5) on (4)

Rhizopods having shells comprised of sand grains cemented together. → foraminifera

The causes of evolution in Paleontology are numerous and it should be difficult to assign them a precise value, can be distinguished:

A.—The fact of *biological evolution* itself with its determinisms unknown or very imperfectly known in actual knowledge of genetical factors.

B.—*Action due to* (2): changes in the type of chemical composition of sea water in which deposits are made at a certain period can have produced changes in the characters of the species: for instance abundance of dissolved silicon in the seas at a certain geological periods might have an influence upon the development of arenaceous foramifera. The quantity of carbonate of lime in water may have a repercussion on the width, size, hardness, of the test of Invertebrates and over-all, of their number of specimens and upon their internal morphology and their physiology. Maybe for Corals the quantity of lime in solution in water takes part as well as climatical conditions (temperature and depth conditions).

C.—*Action due to (3)* (fig. 2): Orogenic movements are one of the numerous

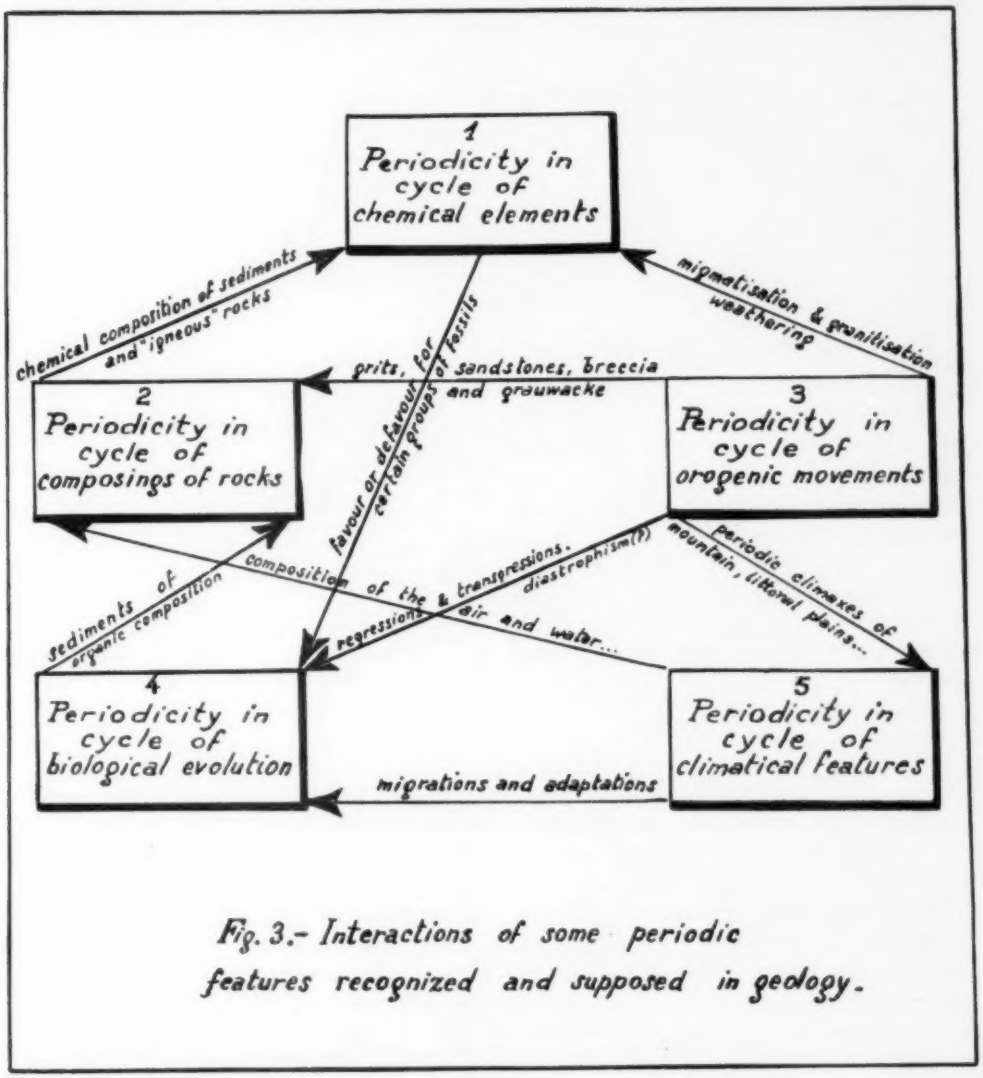


Fig. 3.- Interactions of some periodic features recognized and supposed in geology.

factors which produce the transgressions and regressions of the seas through the geological ages. Populations of fossil genera and species, so might have evoluted (fig. 2A) in a certain period of orogenic and climateric stability in a place (P) (for instance in a beach-zone in littoral conditions of living) to give (S_1). Then happens a regression, (fig. 2B), the differenciated and adapted species (S_1) undergoes variations in their conditions of living, and may: (1) die because lack of adaptive potentiality or (2) give another species, by genetic mutations or by selective adaptation (M). The original species can remain in depth. Afterward, if transgression occurs (fig. 2C) the same original species or genus can give by adaptation to the new conditions in a second place R the new species (S_2).

D.—*Action due to (5):* In this special case, the hypothese is more classic and the process are of the same sort that precedently (RAULIN, 1876-1877, and other authors).

Influence of (5) on (2)

The climax, the contain of the air in CO^2, H^2, N^2, O^2, etc. . . . the temperature of the earth crust have had an influence on the type of sedimentation which does not only depend of the depth of the basin of sedimentation, but depends more of the apport coming from the continental areas, which itself depends at first of the type of weathering and dissolving of rocks. More or less, the chemical equilibrations between the different salts in solution in water has a great part in the deposit of such element in the sedimentary basin.

Influence on (3) to (2)

Rhythmicity in the types of sedimentation is often related to orogenses; we give only for instance this fact: An old phase of weathering right after the surrection of a mountain range gives deposits of conglomerates, grits, standstones and similar sorts, the weathering of a mountain range being more important *during* and immediately after his surrection. The grain of deposits is smaller and smaller with increasing of time, in respect to the factor (5) and others. So we are obliged to considerate the rhythm in the succession of the Earth's upper levels.

Other points can be discussed and works of details may be looked for on such or such influence of rhythmic features others than those here described.

An other point may be remembered: the possible influence of rhythms in cosmic features, such as variation in the solar radiation and other facts on the earth rhythms. The hypotheses of MILNES and others are interesting speculations, despite they are deprived of strong bases. It is conceivable that the features external to the planet and effects of which are not visible with actual means of investigation have taken a part in the geological features. A picture on very smaller scale can be given for this influences: the cyclic phenomen of movements of seas and oceans (tides) with lunar attraction in which we distinguish two parts: a cycle of great amplitude (scale of one year) and a cycle of smaller amplitude (scale of one day). Here, in the Earth Sciences, we ought to replace the day by the geological period and the year by the geological era.

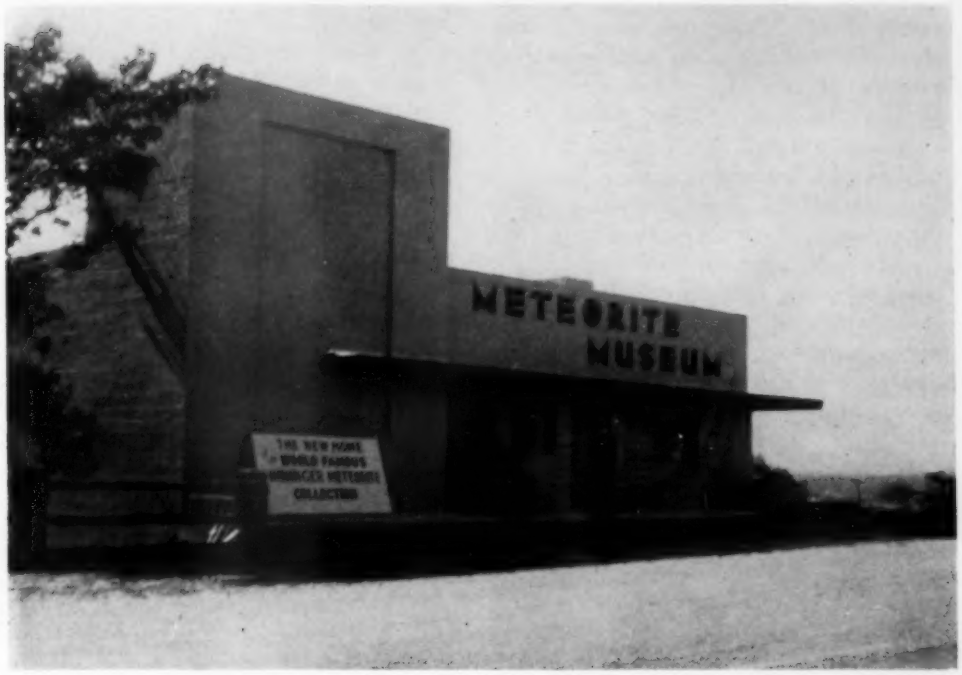
It is convenient to remember here the great importance of many of these rhythmical features in stratigraphical definitions. But some other aspects here described have not been well studied and will be a great field for searchers.

P. A. SAUVAN

HELP EXPAND FREE MUSEUM

Marion A. Speer, of 7862 Speer Avenue, Huntington Beach, Calif., whose free Western Trails museum has helped introduce thousands of school children and adult visitors to the earth sciences and western history, has a surplus of cabochons he has cut himself from California gem materials. He is offering to send a choice one to anyone who mails him $1. Proceeds will be used to expand the museum.

NEW AMERICAN METEORITE MUSEUM



After 30 years the Niningers have finally been enabled to move their meteorite collection into a building that is both beautiful and efficient for the operation of their educational program. Their new Museum was opened exactly seven years to a day, after the opening at their previous location near Meteor Crater at Winslow, Arizona.

The new building is located in the village of Sedona on U.S. 89A, south of Flagstaff, at the lower end of the extravagantly beautiful Oak Creek Canyon, which many people consider the most beautiful spot in Arizona. (P.O. Address, Box 146)

This new location is readily accessible throughout the year from U.S. Highway 66, and from the populous areas of central Arizona and southern California.

The building with 40 per cent greater floor space has been equipped with new, specially designed, display cases and a monitor placard system designed to serve science classes at all levels from the grades through college. By means of this system a visitor may learn at a glance where to find material bearing on any one of 25 meteoritical problems. Then, in the designated cabinet he will find the various specimens explained.

A number of entirely new and unparalleled exhibits have been added, among them several pointing up entirely new facts regarding Arizona's great meteorite crater. No one driving through to Southern California can afford to miss this most interesting and educational wayside attraction.

Dr. Nininger, who is on the editorial staff and a regular contributor of Earth Science Digest, is ably assisted in his research by his good wife Addie D. Nininger. He is America's outstanding authority upon the subject of meteoritics and his books and articles are always eagerly read.

Recent articles in the Digest by Dr. Nininger are, "Meteorites of Xiquipilco, Mexico" (Vol. VI, 3, pg. 19), and "Symmetries and Asymmetries in Barringer Crater" (Vol. VII, 1, pg. 17). Other articles from his pen will appear in early issues.

CARRYING ON FOR JAMES L. KRAFT

The late James L. Kraft, founder of the famous food company that bears his name, shared his enthusiasm for lapidary work in a number of ways. One of these was through lectures and demonstrations before clubs, church groups and the like, and it would be difficult to estimate how many thousands first learned of this fascinating hobby through him. No doubt many of the present "rockhounds" of the middle west, particularly, owe their first taste of it to having heard a lecture, well spiced with humor and personal experience and delivered in a characteristic strong and slightly strident voice, by this devotee of the art of gem cutting.

Ralph F. Beach

The only member of Mr. Kraft's family who followed in his lapidary footsteps is Ralph F. Beach, son of a sister of Mr. Kraft, and at present a resident of Chicago's north side. It has been his responsibility to be in a sense the executor of this phase of his uncle's life. Knowing Mr. Kraft's deep interest in his lectures, he has undertaken to carry on, and, when available, will be open for engagements before lapidary and mineral clubs of the middle western area, as well as before other interested groups.

His subjects include a lecture on the jade window, inspired and given by Mr. Kraft to the North Shore Baptist church in Chicago; a review of his uncle's book, "Adventures in Jade," with slides of places and specimens; Mr. Kraft's widely heard talk, "Sermons in Stones," in which he likened gem stones to types of people, and a lecture on lapidary processes.

Through the kindness of Mrs. Kraft, Mr. Beach has available for lecture use many of the collections of polished slabs and specimens used by his uncle to illustrate lectures, and the opaque projector which casts an image of them on a screen.

Mr. Beach will be leaving Chicago next April to become a staff member of the American Baptist assembly at Green Lake, Wis., where one of the most elaborate and extensive summer conference areas in the nation is maintained. Here he will also help direct the new lapidary shop, fitted out with Mr. Kraft's own lapidary machinery, and stocked with gem rough from his shop. This shop will be open to guests at the assembly grounds, and lapidary instructions will be provided. A small museum of mineral specimens from his collection has also been provided.

Mr. Beach's duties will be heaviest in the summer, so that he will be able to give more time in the fall and winter to lecturing. He may be reached this winter at his home, 5917 N. Washtenaw St., Chicago, and after next April at Green Lake, which is 33 miles west of Fond du Lac.

Russell MacFall

URANIUM PROSPECTOR HOME AGAIN

Wayland W. Magee, well-known uranium prospector and author of "Into the Dinosaur Country"; (May, 1953 E.S.D.) informs his many friends, by means of his unique Christmas Season's Greetings, that he is "now back on the home farm again at Bennington, Nebraska."

HOW LARGE IS THE UNIVERSE
and How Did it all Get Started?

Dr. Ben Hur Wilson, Joliet, Illinois

This we may never know! In the first place we might ask—what is meant by the term Universe? Scientists, especially astronomers, think of it as the occupied part of space, that which is occupied by matter itself. Of course, beyond that, one's imagination might run on forever and ever, and presumably there is no end to empty space, which must extend infinite distances in every direction.

Theoretically, at least, in the beginning all matter existed as infinitely minute particles of negatively and positively charged masses called electrons and protons. There were also other like particles which carried no electrical charge, which are called neutrons. Under the universal force of gravity these simple forms of matter gathered slowly at first and then more rapidly into one great central nebulous body, eventually leaving the balance of space comparatively empty.

The Elements Are Born

In this ingathering process, all matter being in constant and rapid motion, possibly one electron, the much lighter negatively charged particle, played merry-go-round with one, positively charged, much heavier proton, to form a permanent combination known as the simplest of the atoms, hydrogen. This typical association must have been repeated over and over almost an infinite number of times.

This little game may have gone even a few steps farther, for among those pristine hydrogen atoms, in all probability, there must have been some "sports" (unconforming), where a second or possibly a third party, one or two of these uncharged neutrons, broke into this tight little circle, competing for possession of this lone hydrogen electron, and thus we have what today modern science calls heavy hydrogen atoms, known as "deuterium" and "tritium." Perhaps, even more rarely, these heavy hydrogen atoms may have actually captured a second electron, forming an occasional atom of helium, that sedate, well-balanced atomic personality, so aloof (inert) and well satisfied with himself, that under no circumstances will he enter into chemical combination with any other element. This perhaps, must have been about as far as the matter went at this particular stage of creation.

As mass density gradually increased within this central nebulae, tremendous pressures and temperatures were built up which it is thought finally resulted in one gigantic, super-terrific creative explosion, at which time, in less than the "twinkling of an eye," atoms of all kinds were created out of the simpler ones, and started on an endless expansion, radiating outward at a speed approaching that of light, through all space, on a journey which never has, nor probably never will, cease. Thus Nature's building blocks (the elements) were born, and this, substantially, is the theory of the expanding universe with which scientists of all sorts are, at present, so much concerned. Mere man even now is toying with this same idea, in his limited efforts, toward perfecting the "Hydrogen Bomb."

Counter Theory Advanced

Doubtless, these are essentially the facts, if our interpretation of what may now be observed through our telescopes concerning the outward flow of light-giving objects is correct. Perhaps, only one counter-theory has ever been advanced, attempting to account for this strange visible phenomenon otherwise, and that is Wilson's, *"Theory of the Accelerating Light Corpuscles,"* published some years ago in Popular Astrono-

my Magazine, which might possibly account for the same effects, in a negative (incoming) manner, instead of a positive (outgoing) one. To our knowledge this theory never has been seriously evaluated.

At any rate we must admit that at present, most of our ideas, and our thinking, is constantly of an expanding order, as though there might be no end to anything whatsoever,—all time, space and even energy itself seems limitless. Indeed, research now being made with the new giant 200-inch "Palomar" telescope seems to bear out these theories.

According to the *Chicago Tribune* News Service,—recent "Measurements at Palomar observatory, Mount Palomar, California, show that the entire visible universe outside the earth's own galaxy is twice as far away, twice as old, and eight times as big as science previously had thought.

The National Geographic society says that measurements made up by Dr. Walter Baade of the California Institute of Technology's Mount Wilson and Palomar observatories show that Palomar's 200-inch Hale telescope can "see" twice as far and captures light from the farthest star that has been on its way to earth for two billion years instead of one billion.

Galaxy Scaled Down

"Island universes" of stars, similar to the Milky Way but at staggering distances out in space, are twice as big as had been supposed, and our own galaxy, instead of being an unexplained giant, is scaled down to more matching size.

Distance nebulae, believed by the theory of the expanding universe to be rushing away from a common center at ever increasing speeds, have taken twice as long to reach their positions. Thus, the universe is twice as old, on a scale of four billion years rather than two, and the earth's estimated age of about three billion years is no longer puzzling.

Camera Used Four Years

Within a somewhat smaller sphere of vision Palomar's 48-inch "Big Schmidt" telescope-camera has for four years been systematically photographing every part of the visible heavens in a sky survey sponsored by California Tech and the National Geographic.

From this map of the universe astronomers expect to find new clues to how matter is distributed in the heavens, how it behaves in space we can see, and thus how it presumably acts in unknown space beyond.

Literally thousands of new nebulae and clusters of nebulae are being discovered as the photographic map is built, and the society says that from them may come the opportunity for man to learn *how large creation really is*, whether it has boundaries and a beginning, or whether it extends on endlessly and agelessly beyond all grasp.

Dr. Hubble Passes

Ed. Note: We regret to announce, in connection with the above article, the death of Dr. Edwin Powell Hubble, at the age of 63, on September 28, 1953. Dr. Hubble, one of the world's most noted astronomers, director for the 200-inch "big eye" Mount Palomar telescope, was credited with discovering evidence that the entire universe is rapidly expanding, moving outward from a common center. He also found that many nebulae once thought to be only clouds of white hot luminous gas, were actually similar to the earth's own milky way galaxy, being composed of millions of sunlike stars.

Dr. Hubble, born in Marshfield, Missouri, November 20, 1889, was a graduate of the University of Chicago, and studied at Oxford University, England. He began his career as a lawyer. He was a Major in World War I, later became an expert in the science of ballistics, and was chief ballistician of the Army ordnance during World War II. He joined the Mount Wilson Observatory in 1919.

WORLD'S DEEPEST PRODUCER

What is said to be the world's deepest producing oil well, 17,183 feet deep, was drilled recently in Louisiana. To set this new record, oil men solved special drilling problems and developed new techniques.

JUVENILE WATER

AND THE MAN WHO FINDS IT

by Gaston Burridge

Juvenile water is the offspring of heat and pressure. It is conceived where fluid magmas of earth's creation still slowly cool into crystalization of basic foundation stone. It flows into life from dark caverns in the spider webs of fissures and pipes which net-work all deep igneous rock.

The first time I saw Juvenile water, it came hissing and scudding in a white arc from a pump's 10 inch outflow pipe. Across that spirant-breathed curve of magic moisture stood Stephen Riess—finder of this mysterious, seldom-seen liquid.

Riess is a tall, well built man—strong featured and with a shock of gray hair always at odds with the canyon wind. He was born and trained in Germany. He is a geochemist and geologist and the only man I have ever heard of who locates and drills juvenile—sometimes called "Primary" or "Magmatic"—water wells.

We stood together on a high, steep side of Black Canyon overlooking most of Simi Valley, California. It lay October-brown and sun burned from a year and half's drought. Riess swung his arm out over the valley as he said, "There isn't an ordinary well in all that valley which hasn't suffered greatly from a steadily declining water table this past year. Many of the wells have gone completely dry."

Squinting into the westering sun, I followed his pointing finger downward and half way across the valley. He continued, "That well is 1000 feet deep, but it can only be pumped a few hours at a time, then they have to let it 'rest.' If they didn't, they would 'pump the bottom out of it!' "

I turned to look at the hissing stream of water coming from a well high above the valley floor. Riess smiled at the bewildered look on my face, and he said, "That, is juvenile water. It has never seen the daylight before. It is just now becoming part of the 'hydraulic cycle'."

"How old is this well?" I asked.

"A little over two years," replied Riess.

"How often do you pump it?" I questioned.

"Every day I am at home," he answered. "It is a gentle reminder to some folk that the 'Crazy Man Up Black Canyon Has The Water'!" There was a glint in his blue-gray eyes and a curl on his lips which spoke volumes.

"Where does this juvenile water come from?" I asked.

Mr. Stephen Riess, Juvenile Water Prospector.

"I can't tell you exactly," said Riess, "But I can tell you generally. It is instigated in the giant batholiths of hot magmas deep within the planet. As they gradually cool and crystalize into the basic stone making up the crust of the earth, there are huge quantities of elemental gases set free. These gases are as hot as the magmas themselves and are under tremendous pressure. It is difficult to grasp the excruciating pressure everything is under at such points—prob-

ably thousands of pounds per square inch. Being lighter, and therefore more free to act, these gases wedge themselves into the cracks and cranies of the cooling rock. As they rise, they cool. As they cool, they contract. As they contract it makes more room for more gases to push in behind them. As they continue to rise they pass over other cooling materials with which they react to form new compounds. Juvenile water is but one of many of these, and depending on what the water's association with other materials is, and where and how it was made, determines whether or not it will be cool and sweet, or hot and mineralized. Fully 75% of all primary water is so highly mineralized and so hot, it is no use to humans or agriculture. The trick is not so much how to find juvenile water as it is how to find cool, sweet, usable juvenile water.

"Primary water wells are not affected by surface of the earth conditions. Drought is as far from affecting them as the moon." Riess continued, "Every well in Simi Valley can dry up and this well will continue to flow. If Simi Valley didn't get a drop of rain for a hundred years it would not affect this well because the source of its water is outside the hydraulic cycle. Juvenile water is far removed from climate as can be imagined, yet it is a vital part of the earth's functioning."

I turned again to look at the swift, sizzling arch of water cascading into happy song down the steep canyon side. Mr. Riess smiled at the amazement plainly showing on my face. "Come," He said, "I want to show you a primary water well which is 19 years old. It flows today as copiously as the hour it first came in. Through all these years it has never shown the slightest trace of failure. If anything, as nearly as I can judge, it has more water now than when discovered, probably due to the gradual cleansing and flushing effect of pumping all this time."

This nearly 20 year old well is even higher up the canyon side. Of the 70 juvenile water wells Mr. Riess has drilled, this one is #3. One in Brazil and one in Peru being numbers one and two respectively. Riess has drilled six primary water wells in Mexico, one in Canada and 60 in the United States. #70 has just been completed and #71, now drilling in Fallbrook, California, will probably be brought in before this gets into print. Of the 70 wells drilled, all but three have been outstanding successes. "I learn something new on every well I drill," remarked Riess, "And I now feel sure I know why those three wells did not fulfill my expectations."

It might not be out of place here to remark, that so many successful wells drilled in so wide a territory, either makes Stephen Riess the most "lucky" man in the world, who could make a much better living at Las Vegas, Reno or Monte Carlo, or is much more than "circumstantial evidence" that his theories are correct.

As we climbed the pathway leading to the 19 year old well Mr. Riess pointed out various reforestation projects he has conducted on his own land, not only to beautify his home site but also to prove several more of his theories along other than juvenile water well lines. It was the constant and plentiful source of water, furnished by this #3 primary water well, which has made these reforestation projects successful.

"How did you come to learn about the possible existence of primary water in quantities large enough to make it worth while drilling for them?" I asked.

Riess thought a while—then answered slowly, "That was many years ago and I do not recall certainly, but I believe my first idea of juvenile water came from something I read in an old book first published more than 90 years ago. I do not recall the exact title. Its author was a Dr. Farber, I believe. I have a dim recollection of a set of books called "The Face Of The Earth." I saw a work, first written in 1905, by Dr. Waldemar Lindgren, called "Copper Deposits of the Clifton-Morenci District of Arizona," in which "Water in Magmas" was discussed. It occurred to me that if this primary water was made in the interior

Well No. 70. At the Stephen Riess Ranch.—Riess Stands by Test Pump throwing 1500 Gallons per Minute. (Photo:—Primary Water Development Company)

of the earth, something must happen to it —eventually—it could not go on collecting forever. From there to here, has been a long, up-hill and arduous journey full of disappointments and heartbreaks, being scorned by all but a few of my profession. But things are beginning to turn now. I feel sure we have something good for mankind in dry lands."

As I talked with Stephen Riess I began to see he does not go to the valleys to find primary water wells—although, under some conditions, it may be found there. No, he goes to the high, often steep, sides of mountains—frequently, the tops of mountains. Indeed, a strange place for a water well!

I ventured another question. "How do you go about locating a juvenile water well?"

Riess looked at me steadily a long time, then shook his head negatively. "That is my secret," he replied, "It has taken years of hard work to pry it loose from Nature. No, I won't tell you the secret, but I will give you some hints. Someday, I will tell the secret—but not yet."

"Let us assume a case," he continued. "I will go a little way down the road with you. If you can find your way from there on, fine, if not, well, you will have to wait."

We sat down under a pine whose trunk was 15 inches through. Riess had set it out as an eight inch high seedling less than 20 years ago. "Suppose," he said, "I am called to make a survey for a possible primary water well. From my knowledge and experience, I can pretty well judge the possibilities of success by looking at the general "lay of the land." Let us say the prospects look good.

"Next, I make a careful survey of possible sites and pick the one, in my judgment, which is best. Perhaps they are too hard to choose between. In that case, we survey them both and let the more concrete evidence decide as it comes along. If they still prove to be of equal merit, then, we choose the one most economical to operate on.

"Having decided on a site, I make a careful analysis of its structural geology. How the faults and strata lie in relation to one another and to themselves, also how they lie in relation to the points of the compass is important. Such a survey requires from three to five days to make. If, after the evidence thus collected gives satisfactory indications the site still holds definite possibilities of primary water potential, we have core drillings made to a specified depth. These depths vary with each site.

"In addition to the studies I personally make of these core drillings, they are sent to any one of several commercial laboratories, equipped to perform the necessary services required, for certain chemical, crystallographic and petrographic analyses. When these results are returned, I cor.elate them with my own findings.

"At this point I can predict at what depth from the surface the flute carrying the primary water lies, thus how deep the well will have to be drilled. At this time, also, the volume of water which the well will produce is evident.

"But having determined the site does not mean we have the well! Fully 50% of the success in finding a primary water well is in its *drilling*. I know of only four drillers capable of drilling the kind of holes I must have. Why? Mostly because the driller is drilling through rock all the way. He not only must *know* what he is doing every minute of drilling time, but he must not be lazy and fail to *do* what he knows he must do when it must be done!

"Juvenile water wells have to be *straight* —not straight just *one* way—but *both* ways. They must be plumb. This is important because targets are frequently small and if a bore is not straight both ways it can easily miss. Here, a small miss is as tragic as a large one.

"In drilling for juvenile water, quite often other fissures than the one carrying the water sought, are encountered. Sometimes these are of considerable depth. On the last well we drilled we ran into one nine feet deep! Frequently, we cut through the side of a fissure. This presents a condition

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ARCHEOLOGY: AMATEUR AND PROFESSIONAL

by George A. Malott

The literal definition of archeology is the science of antiquities, the study of prehistoric remains or relics of the earlier races of mankind. A more usable definition to the archeologist is a study of past human culture.

With this as a starting point we will attempt in a series of articles to outline the aims and objectives of the American archeologists. These are to study the former culture of the American Indian and their development.

The unearthing of past civilization is one of the most fascinating detective stories extant in the world today. The reason for this is that in a great many cases the archeologist has only a momentary glimpse of the clues which may be as etheral as a change in color or texture of the soil he is digging. Many of the clues he turns up have no counterpart in the world of today. And in the case of the American Indian there are no written records. It is sometimes impossible to determine the use of an artifact he finds. Because of a carry over of customs to some of the present day Indians, he can make a fair guess as to the significance of some of the artifacts and the decorations found on them. This is only true in a small number of cases, principally of cultures in the southwest and the late cultures in the eastern and central states.

The Indian was very adaptable, readily copying customs from other tribes or from the white man. He was quick to see that an iron or steel tool or weapon was far superior to anything he was able to fashion from stone or other material. Thus the practice of stone working was discarded rapidly. This also is true of almost all the things he made so we have practically none of the ancient Indian handicrafts left.

It must be realized that once a site is dug or disturbed it has been destroyed FOREVER unless the information it contains has been properly interpreted and recorded. Therefore when an Indian site is discovered extreme caution must be used so that as much information as possible be obtained from it.

The reciprocal relationship between the amateur and the professional can be very profitable to both. The amateur, due to his greater numbers, can cover a large area in the search for Indian occupation sites, while the professional can aid in expert interpretation and methods of recovery. During walks in the countryside there are many times when stone chips, made by the Indians in the manufacture of tools, are found on the surface of the ground. Also at times an occasional projectile point or other stone tool or weapon will be found. Many times this is an indication of an occupation area, either a camp site or a village. It is very important that the amateur be able to recognize pottery fragments. When these fragments, or sherds, are found it is almost certain that an Indian site has been discovered. It is advisable that the exact location be recorded. If this information is given to a professional archeologist he will be able to help or advise you on how to proceed with the investigation to gain the most from the discovery.

One thing that should be remembered at all times is that in the United States all of the land is owned by some one. No one should trespass on private property as sometimes very embarrassing incidents can occur when they are accosted by an irate owner. On state, county or federal lands one may search the surface as much as he will for artifacts but before any serious investigation of a discovered site is made one must get a permit from the governmental agency that controls the land.

When the amateur archeologist takes to

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WHERE RESTS THE CARDIFF GIANT?

(Prize question for January)

On Monday, October 18th, 1869, news of an amazing new discovery, a huge petrified human giant, on "Stub" Newell's farm near Cardiff, New York state, spread over the country-side like wild-fire. Thousands of visitors came rushing in from far and wide to view what was soon pronounced to be the "Eighth Wonder of the World." Even several notable scientists were apparently "taken in" by its natural genuine appearance.

On the morning of Saturday the 16th, so the story goes, two men engaged in digging a well, back of the barn, on Newell's place, a short distance from the small village of Cardiff struck their shovel against some hard object imbedded in the loose gravel in which they were digging.

Not being able to pry the object out, their curiosity at once became fully aroused. Perhaps, they had found a buried treasure chest and they might thereby become fabulously wealthy! Indeed, should this have been true, it is doubted if any such chest could have brought them half the riches than did the object which they actually had discovered.

Digging further, it took only a short while for their shovels to uncover the form of human foot, and soon an entire human figure of gigantic proportion, apparently composed of stone, was brought into view. Mr. Newell, in the meantime, had promptly assumed personal direction of the excavation.

Though there were no telephones or cars available at this early date, news of the discovery traveled swiftly by "grapevine," and soon curious people were flocking in, in great numbers, from the surrounding country-side, and from nearby towns and villages, to see "what manner of man" had been found.

Looking into the muddy trench, they beheld a terrifying sight. There lay the nude figure of stone giant, measuring "some ten feet two and one-half inches in height, with other features in proportion." The right arm was pressed against the back directly opposite. The lower limbs were slightly bent as if by pain, and the left foot resting partially upon the right.

The owners soon sensed that they had a good business proposition, and a tent was erected over the spot where the giant lay, fifty cents being charged to see the object. Barnum was right when he said that the American public loves a humbug. In spite of the "election and unharvested crops," people came by the thousands, cheerfully paying their "four bits" for admission.

Many myths and legends sprung up locally to explain the mystery. The "giant" was eventually exhumed, and much to the dissatisfaction of Syracuse business men who had profited greatly from the tourist trade, it was removed to Albany, where a syndicate paid $30,000.00 for a three-fourths interest in it, William Newell retaining the other one-fourth.

P. T. Barnum, the great showman, attempted to purchase it, and failing, caused a similar statue to be carved, which he also exhibited as the "Cardiff Giant," with almost equal success. The owners of the original one attempted to secure an injunction against Barnum, in which they failed.

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EARTH SCIENCE QUIZ NO. 10

TEST YOUR KNOWLEDGE! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock-hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect. Answers Page 27.

a.—(1) adventurine
b.—(1) bullion
c.—(1) jet
d.—(1) cassiterite
e.—(1) opalescence
f.—(1) stria
g.—(2) chat
h.—(2) schist
i.—(2) diatomite
j.—(3) chatoyant
k.—(3) loesskindchen
l.—(3) esker

STUDIES IN COAL

IV. THE DISCOVERY OF COAL

by Frank L. Fleener, Joliet, Ill.

It is difficult for us to realize that it is only within comparatively recent times that coal has come into general use as a source of heat and power. However, there is little doubt but that the substance was discovered and that its qualities were known many centuries ago.

Possibly the earliest known reference to coal is to be found in a treatise on "Stones" written by Theophrastus, a pupil of Aristotle, about 315 B.C. This passage reads as follows: "Those substances that are called coals and are broken for use are earthy, but they kindle and burn like wooden coals. They are found in Liguria where there is amber, and in Elis over the mountains toward Olympus. They are used by the smiths."

In the Bible and other ancient books, there are many references to coal that antedate the passage quoted above, but it is believed that they refer to charcoal.

It is claimed by some historians that coal was mined in Britain prior to the Roman invasion in 55 B.C., but no records that we know of have been found to substantiate this claim. The first authentic record is dated 852 A.D.—in that year twelve cartloads of fossil fuel or pit coal were received by the Abbey of Peterborough, as rent. However, coal was not systematically mined in Britain until about the year 1180.

By the end of the thirteenth century the use of coal had become very popular in London. But the people of that city conceived the idea that its use was injurious to the health of the inhabitants generally, so they petitioned Parliament that the burning of coal within the city be prohibited. Strange to relate, this petition was granted and king Edward I made it a capital offense to burn the dreaded fuel. This checked the coal mining industry for half a century, when again we note that Edward III granted a license to the people of Newcastle "to digge stones and cole in the common soil of the towne."

In Scotland coal was mined in the 12th century, and in Germany in the 13th. The Chinese had become familiar with its use long before this. But in Paris the same prejudice that had interfered with its use in London was also aroused against it and it did not come into general use here until the 16th century.

Coal Discovered in America

The first record that we have of the discovery of coal in the United States, was made by Louis Joliet and Father Marquette in 1673. On a map of their explorations they marked the site of a coal outcrop on the banks of the Illinois River near the present city of Ottawa, Illinois.

The oldest coal workings in America are doubtless those near Richmond, Virginia. It is supposed that coal was discovered and mined there as early as 1750. This area has ever since continued to produce an excellent quality of bituminous coal. The bed extends over about 130 square miles and has an average thickness of twenty-four feet.

Another of the early discoveries of coal in the United States had quite a different history. The Rhode Island anthracite bed was discovered in 1760, and was opened in 1808. The operators had great hopes for the future of the enterprise, but difficulties arose when attempts were made to burn the coal in other than open grates, and the output of the mines dwindled to the trade of the immediate vicinity.

Ashley, who had been sent by the United States Geological Survey to investigate the matter reported unfavorably, "It has been contended that in the Last Great Conflagration, Rhode Island coal will be the last thing to burn." In the Rhode Island field

the isostatic pressure has been intense, not only folding the rocks into great folds, but crushing and squeezing and shearing them with accompanying heat so high that in some cases the rocks have been changed both chemically and physically. As a result of this great heat and pressure the coal has been changed from the softer varieties to anthracite and the material of the beds has flowed until the original structure has been practically all lost, and all or nearly all of the combined carbon and hydrogen driven off, so that the material has reached the last stage in the coal-carbon cycle, becoming GRAPHITE.

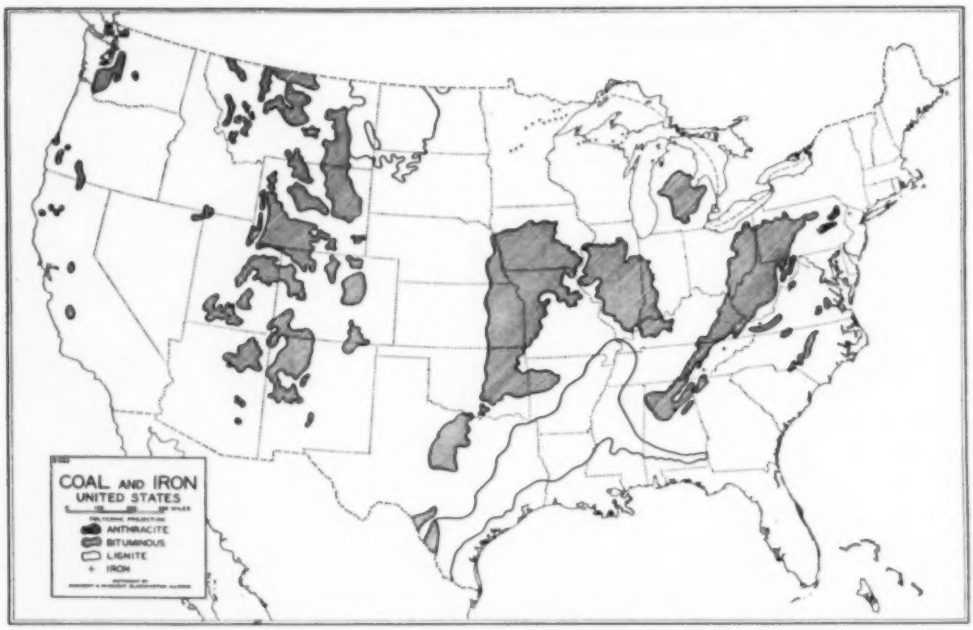
William Cullen Bryant, the poet, in one of his rare lighter moments, wrote "A Meditation on Rhode Island Coal," in which he indicates some of the popular opinions of the time concerning this fuel as well as some of its good points. Its successful domestic use is suggested in the opening of the poem—"I sat beside a glowing grate, fresh heaped with Newport coal."

That the difficulties encountered while attempting to burn it were fully appreciated, are also indicated near the end of the poem—

"Thou shalt be coals of fire to those that hate thee,
And warm the shins of all that underrate thee;
Yea, they did wrong thee foully—they who mocked
Thy honest face, and said that thou wouldst not burn;
Of hewing thee to chimney pieces talked,
And grew profane, and swore, in bitter scorn,
That men might to thy inner caves retire,
And there unsinged abide the day of fire."

Development in Use of Coal

It is impossible to ascertain the date when the outcrops of the great bituminous district of western Pennsylvania and Ohio were first seen by white men. It is to be remembered that the hardy pioneers that first invaded this region for the most part had little knowledge of the art of writing, and circumstances were far from conducive to the use of such knowledge as they possessed in recording where they had been or what they had seen. Of one circumstance,



Base Map of the United States Showing location of Coal and Iron Deposits
Courtesy of McKnight & McKnight

however, we are quite certain, in the summer of 1744, General Braddock led his army of British grenadiers through western Pennsylvania by a military road especially constructed for the purpose. This road crossed the outcrop of the Pittsburgh coal several times, and Colonel James Burd, one of the engineers, claimed to have burned some of this coal in his camp fire at that time. From 1770 to 1777, it was a common thing for the maps of the Ohio River country to have marked on them the location of coal seams; these are now known to be outcrops of the great bituminous deposit.

The valley of the Wyoming was settled by people from Connecticut, in 1726, and in the fall of that year they reported the discovery of coal. This is perhaps the first discovery of anthracite coal, or as they called it "Stone Coal." But they could not make their coal burn. Repeated trials met with repeated failures. However, one Obadiah Gore, a blacksmith, in 1769, took some of the coal to his shop and succeeded in getting it to burn. So far as is known, he was the first man to demonstrate the value of anthracite as a fuel.

The next discovery of anthracite was in the Lehigh River region, in 1791. The find was accidental. Phillip Ginther, a hunter, returning to his cabin, late one evening, stumbled over a black stone that looked so peculiar that he picked it up and carried it home with him. The next morning he took it to Colonel Weiss, who pronounced stone coal. In Philadelphia, Weiss interested Cist and Hilligar in the project of securing the property and developing a mine. After some experimenting they were able to solve the problem of burning the coal without an artificial draft. They did all that they could to introduce the new fuel, even going to houses and making practical demonstrations of their method. Even with all this the introduction of coal as a domestic fuel was a slow process. People looked upon coal with suspicion, considering it nothing more than black stones and seeing no reason why it should burn better than stones of any other color.

In the Pottsville district coal was discovered about the same time and in much the same manner, but no practical results attended the discovery at the moment. In the middle anthracite district, coal was not discovered until 1828. This discovery was also made by a hunter, one John Charles, and it resulted in the formation of the Hazelton Coal Company which raised and shipped great tonnages of coal during the 19th century.

Coal in Illinois

The first discovery of coal on the North American Continent was made in what is now the state of Illinois. Authorities differ as to when and by whom this discovery was made.

The World's Cyclopedia and Dictionary of Universal Knowledge gives the honor of this discovery to Father Hennepin in 1669, on the Illinois River near the present site of Ottawa, La Salle County, Illinois.

Also in the Mineral Resources of the United States, Part 2, 1913, on page 832, it says—"The first mention of coal in the territory which afterwards became the United States is contained in the Journal of Father Louis Hennepin, published in Paris in 1698. The Journal contains a map on which is marked 'Cole Mine' on the banks of the Illinois River near the site of the present city of Ottawa. Hennepin having passed through this region thirty years before, in 1668."

Prof. Beman, in Bulletin 56 of the Illinois State Geological Survey, states—"Joliet and Father Marquette on their voyage of exploration in 1673 by way of the Illinois Valley and Chicago River made the original discovery, some place between the present cities of Utica and Ottawa."

In order to understand why some authorities disagree concerning the discovery of coal in Illinois, when and by whom, we must enquire somewhat concerning "the now fameous" Father Louis Hennepin, a Franciscan friar, who came over from France in the same ship with La Salle in

(Concluded on Page 38)

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Craven's Diamond Shop Co.
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Toiyabe Supply Company
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Westfield Lapidary & Sup. Co.
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Lost Cave Mineral Shop
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Technical Products Company
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TEXAS
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PRIZE QUESTION

(Continued from Page 20)

Not everyone was as credulous as were the scientists at the time, and much skepticism developed concerning its origin and its motive. The appearance of George Hall to share in the profits could never be satisfactorily explained. Some recalled that about a year before a mysterious four-horse team with wagon carrying a huge iron-bound box had been seen in the vicinity of Cardiff, and some claimed that they recognized George Hall as the man in charge. "It is only a box of machinery," they said, when the curious asked of its contents.

To bring our long story to a close, it was finally decided that the "Cardiff Giant" was a humbug. Galusha Parson, a lawyer from Fort Dodge, Iowa, stopped one day to see the "Petrified Giant," and immediately recognized the material as Fort Dodge gypsum. Writing to his home paper he stated, "I believe it is made out of the great block of gypsum those fellows got at Fort Dodge a year ago, and sent off east."

Subsequent investigation showed that, two men, in 1868, had registered at a Fort Dodge hotel, who seemed to be intensely interested in the local gypsum deposits. They were also extremely secretive concerning their business connections, and were regarded, at the time, with a great deal of suspicion. For this reason they were distinctly remembered by many with unusual clearness, and so it was possible for local amateur detectives to piece the story together with considerable accuracy, without difficulty.

It seems as though the man had attempted to purchase a block of gypsum, with dimensions of at least 12 x 4 x 2 feet, from C. B. Cummins, explaining that they wished to exhibit it in New York. To one man they said it was to be Iowa's contribution to Lincoln's Monument.

The order was refused by Mr. Cummins, and so the men leased some land and hired a quarryman named Michael Foley to get out the block of the size desired. It was freighted to Chicago, where a German stonecutter carved the figure, Hall himself it is said serving as the model. Hence it was cased in the ironbound box which was next seen in New York on the wagon bound for Cardiff.

Quite naturally after it had been proven definitely that the "Cardiff Giant" was a "down right fraud," interest in it as an exhibition object soon waned and due especially to its great immobility on account of its large mass and weight, it gradually became a "white elephant" on the hands of whoever owned it, and was exhibited only occasionally throughout the years.

However it was later acquired by interested parties, who desired to preserve it permanently for its unique historical and pseudo-scientific value, and removed to a final resting place where it may now be viewed by looking down into an open tomb-like excavation prepared by them for this purpose.

Question. Where does the famous "Cardiff Giant" now lay resting?

Alert: One annual subscription to E.S.D. will be given the first person (earliest post mark) reading this story, who writes us, the exact location of final resting place of the "Cardiff Giant," by whom owned, etc. This information will be published and the subscription credited to advance, or, to any other person designated by the winner.

Mail to the Editor

GOLD QUARTZ IN MINNESOTA

A Letter From

Raymond E. Gatz,

Anchorage, Alaska

Dear Editor: I am writing concerning the Pioneer Gold Mine story in the November issue of Earth Science Digest. You probably have received several answers on the story even though the directions given in the article appear to me to be wrong;—unless there are two locations.

I was born and raised in Winona, Minnesota, and know the area quite well. I

showed the article to a friend of mine who had roamed the entire country on foot hunting coon. Several years ago he had mentioned a gold quartz mine to me, about 30 miles from Winona and thought the placer came from this quartz. So the next time my friend came around I got the details from him.

The location was on the Whitehead River, which flows into the Mississippi at Minneska. The area I have in mind is northwest of Winona, not southwest as you have given. Southwest would take you to the Root River. The placer was probably near Big Springs which is in the valley between Altura and Elba, and about a mile from the gold quartz vein which was worked at one time. My friend tells me that most of the streams in this area carry a little gold.

These old timers probably went up the prairie to what is now Minnesota City and up the valley past Rollingstone and over the ridge into the Whitewater drainage. I believe this is still in the driftless area, and it could well be prospected for scheelite among other things. I don't know anything about the production from this placer as I never heard of it until a few years ago.

The gold quartz was discovered while drilling a well, and a corporation was formed and a tunnel was driven in from the side down in the valley. Free gold could be seen in the quartz which would indicate at least a $100.00 a ton. Poor management was responsible for the failure along with misuse of the funds. From what I have heard the mine could probably yet be run on a paying basis if properly operated.

This whole area is underlain with granite fairly close to the surface, around 400 feet at Winona, and probably under 1500 feet in the entire area. It's hard to say what could be found.

A farmer by the name of Tony Heinn could probably show the location of this old gold quartz mine, as he lives on the ridge less than a mile from it, and about a half mile west of Big Springs by road. As the mineral rights in this part of Minnesota go with the ground it would be useless to prospect even though there is no doubt that there may be more gold quartz veins in the vicinity. I spend my summers placer mining by hydraulic methods.

Sincerely,

Raymond E. Gatz

Editors Note: Thank you Mr. Gatz for this most interesting letter. It is of great value for the historical information it contains. While the area we had in mind is really southwest of Winona, it is in the same general region you have mentioned, and so we have awarded you an annual subscription for the splendid interest you have shown in writing.

ANSWERS: Test your knowledge (check the ones you have correct.)

a.—(1) Adventurine; A crystalline form of quartz containing minute flakes of some other mineral (mica, hematite, etc.), causing it to sparkle in the light.
b.—(1) Bullion; Uncoined gold and silver. Gold pig, (brick).
c.—(1) Jet; A very compact velvet-black mineral, of the nature of coal.
d.—(1) Cassiterite; Principal ore of the metal tin. Tin oxide, SnO_2.
e.—(1) Opalescence; A milky or pearly reflection from the interior of a mineral.
f.—(1) Stria; Minute grooves or channels on rock or mineral surfaces; ie. glacial stria.
g.—(2) Chat; Small pieces of stone with ore. Loosely used in Missouri for tailings or waste product from mines.
h.—(2) Schist; A crystalline rock that can be readily cleaved or split,—usually metamorphic.
i.—(2) Diatomite; The silica of diatoms dried to a fine powder, also known as infusorial earth.
j.—(3) Chatoyant; Having a luster resembling the changing luster of the eye of a cat at night.
k.—(3) Loesskindchen; Small calcareous concretions frequently occurring in loess, often spherical or button shaped joined together in numbers.
l.—(3) Esker; A narrow ridge of gravelly or sandy drift. Stream deposits associated with glacier ice.

HURRAH!!

We'll all be There?

June 24—25—26 1954

Announcing

the 14th Annual Convention of the
Midwest Federation of Mineralogical and Geological Societies,
to be held in Milwaukee, Wisconsin
June 24, 25 and 26, 1954, with the
Wisconsin Geological Society as host.

PLAN YOUR 1954 VACATION EARLY!

No one who attended the great American Federation Convention at Milwaukee will want to miss this one, which promises to be even bigger and better. ALL MEETINGS AND EXHIBITS will be at the Milwaukee Auditorium. Juneau Hall has been reserved for 28 Commercial Exhibits. Dealers, make your reservations now. First come—first choice of space. Kilbourn Hall has been reserved for Society and non-Commercial Exhibits.

For space and arrangements write:

OLIVER W. LEX,
Commercial Chairman

GILBERT J. THILL,
Non-Commercial Chairman

Care of James O. Montague, *General Chairman*
1026 East Pleasant Street, Milwaukee 2, Wisconsin

1954 MIDWEST CONVENTION PUBLICITY

"MILWAUKEE – MIDWEST MECCA IN '54"

The fourteenth annual convention of the Midwest Federation of Mineralogical and Geological Societies will be held at the Civic Auditorium in Milwaukee, Wisconsin, next June 24-25-26, with the Wisconsin Geological Society as host society.

We bid you welcome and urgently request that your society be well represented both in attendance and in exhibits, for these enthusiastic Badger rockhounds intend to make this 1954 Midwest meeting exceed the national convention they hosted in 1950.

Three halls in the municipal Auditorium will house the Midwest show: Kilbourn and Juneau Halls, each with floor areas of 5,400 square feet, will provide a total 10,800 square feet of floor space for commercial and non-commercial exhibits; and Walker Hall has been reserved for Federation meetings and business sessions. Juneau Hall is earmarked for 28 commercial exhibits. Official convention headquarters will be at the Hotel Wisconsin, 720 North Third Street, just north of West Wisconsin Avenue, and four short blocks from the Auditorium.

General chairman of the convention is that veteran helmsman, James O. Montague, past president and charter member of the Midwest Federation, who gained most valuable experience in this capacity as general chairman of the 1950 national conclave. His aides will be Oliver W. Lex and Gilbert J. Thill, chairmen of the commercial and non-commercial exhibits, respectively. Both are past presidents of WGS and council members to the Federation. Under their direction a force of enthusiastic committees is being aligned to make the June session a memorable one for all attending.

Already a convention field trip is scheduled to the famous Greene Memorial Museum of Milwaukee-Downer College, housing a renowned collection of paleontology, with Dr. Katherine Greacen Nelson, its curator, as guide. And a post-convention field trip to the Lutz Quarry at Oshkosh for its superb marcasite and pyrite is likewise an assured event.

The educational program will be extensive, covering the earth sciences, as well as gemology and lapidary, with emphasis on the non-commercial displays of individual members and societies.

So MEET ME IN MILWAUKEE — MIDWEST MECCA IN '54.

Dr. H. W. Kuhm
Chairman, Publicity Committee.

ARCHEOLOGY

(Continued from Page 19)

the field on a search for possible sites there are several things he must know. He must remember that the Indians were people with the same basic needs that we moderns have. They needed shelter, food, water and safety from molestation. When we consider this we find that certain situations of topography are necessary to meet these needs. Water of course is a prime need for all men and a spring or unfailing stream was always close by. If the Indians were of a nomadic group and got their food from hunting and gathering, a permanent house would be a detriment. If on the other hand they were agricultural they would have to have a permanent location and store places to keep their food between harvests. Safety was often a prime consideration and an easily defended location was greatly desired. Using these needs as a guide it can be seen that if we were to look for a place to locate our own home or camp, we would probably choose the same place the Indians selected many years ago.

In succeeding articles these factors and other archeological methods will be discussed in more detail.

JUVENILE WATERS

(Continued from Page 18)

where only a portion of the bore is in the rock, the other portion in—nothing. Removing that "nubbin of rock" is a slow, tedious job—but we must do it—we dare not go around it. Of course, all fissures and other openings have to be cased off.

"To show you how narrow our limits often are, I'll tell you a little story. I had located a well for a not-too-distant neighbor and friend. It so happened the well site was extremely near a fence corner on the boundries of his ranch. We found him a fine well. His nextdoor neighbor watched the process with much interest. After the well came in with such spendid results my friend's neighbor approached me with a proposition to locate him a well also. When I told him what the cost would be he was very indignant—said I was robbing him—and went away.

"A few weeks later I received an urgent phone call from my friend. He was much distressed. He told me the neighbor had moved in a drilling rig as close to the line fence as he could get it and was drilling a well. He wanted to know if the neighbor got the well, was the fissure carrying the water to his own well large enough to supply both wells? I told my friend to have no fears—the neighbor would not tap his fissure—that I doubted greatly if the new well would find any water at all. To make a long story short—they didn't!"

Mr. Riess' deepest juvenile water well is a little more than 1400 feet. His shallowest one is 232 feet. He has logs of all his wells. Most of his wells sink from 500 to 800 feet. Often the primary water in the fissure is under such pressure that it will be forced to overflow at the surface. Commonly, the water rises 300 feet in the well from where first contacted.

I asked Mr. Riess if it would be possible to locate juvenile water in the Appalachian Mountains, or in those of Arkansas, as well as in these newer mountains of the west.

"Certainly," was Riess' quick reply, "Wherever you walk on granite you walk over primary water. Just how deep we would have to drill there, I could not say without study of a particular location, but because of the generous amount of rainfall that portion of the country receives, I am not at all sure a juvenile water well would be economically feasible, but there is no question in my mind that primary water exists there."

I related to Riess of having read in Robert Froman's recent interesting book, "One Million Islands For Sale" an account of places among the San Juan Islands, in the Puget Sound country of the State of Washington, where fishermen, on calm days, could dip their buckets into the Sound and bring up fresh water! Also, on some of the Islands, subterranean fresh water had been found which simulated a small geyser. Could this be juvenile water, I wondered?

Mr. Riess remarked he'd be "sticking his neck way out" to answer such a question without at least first seeing the site, but he surmised it would be possible to locate juvenile water in that area and probably that was what it was.

"It would seem almost certain water under such pressure as you describe, located on so small an island, could only come from some internal source, but here again, is the economic feasibility of drilling a juvenile well indicated? That region is also naturally well watered—and I didn't mean to pun! Primary water is only economically sound for those regions which do not have an adequate natural supply."

Primary water is new water—is revolutionary water. It would appear to be a constant source. Whether one has a large water problem or not, it is an interesting new facet on a beautiful old stone. If not "food for thought," then surely, "drink for it."

"ALLEY OOP"

Read all about it—The Dinosaurs in the March issue of E.S.D.

GREEN BRIAR LAPIDARY SHOP

by Al Bernsohn

In a tree-bordered area on Chicago's northwest side stands an attractive dark red building, the Green Briar Field House, 2650 Peterson Avenue. Go around in back and down the stairs to a door marked "Lapidary Shop" and you'll find one of the reasons why there's such a sharp upsurge in enthusiasm for the hobby in the Windy City.

Here, for the past three years, H. C. "Bert" Thornton has been quietly helping dozens of folks advance from nervous, finger-abrading beginners holding their first rocks against grinding wheels to confident gem cutters capable of converting a rough stone to a beautiful finished cabochon.

This isn't the only lapidary shop in Chicago under the auspices of the Park District. There are others at the Park Administration Building, Austin Town Hall, Humboldt Park, Lincoln Park, Gage Park and Grand Crossing Park. But to the nearly 150 enthusiasts who've learned under Bert Thornton's tutelage, Green Briar is lapidary headquarters.

This quietly competent, infinitely patient instructor has been in recreational work since 1938. He instructs Chicagoans in woodworking, metal working, gem cutting, jewelry making and enameling on metal on various afternoons and evenings of the week.

In his lapidary shop are installed six 80-grit verticle wheels, five 220-grit and one 400-grit used for the softer gemstones. All of these are heavy duty 2x12-inch wheels mounted in pairs on railroad shop equipment set to take twin grinding heads and powered by 1/3 hp motors. There's an 18-inch horizontal iron lap used with grit for polishing flat surfaces. Sanding is done on a two-belt wet sander using 100 and 220 grit on the vertical sanding belts. Two wooden wheels are used with tripoli for polishing; these are 2½x10-inches. Two 2x10-inch rock-hard felt wheels are used with tin oxide for the finer polishes. In addition there's a leather disc used with tin oxide or Linde A for the softer stones.

The two important saws in the shop are a Streamliner with a 14-inch blade, operated only by Thornton, and a Nelson trimsaw with an 8-inch blade.

One modern innovation which speeds and improves the work of the groups of amateurs using the shop is a Guild dopping wax machine which controls the temperature of the wax thermostatically keeping it constant and free from flame. It preserves the strength of the wax by not overheating. This has the cup containing the wax resting on a metal arm. Since the arm is electrically heated, there is a range of temperatures to which the stones may be heated before they're dopped, depending on how far out on the arm they are placed.

An MDR Facetor with 64 positions completes the major equipment. This is to be used by only the advanced students.

In addition, the shop contains supplies of dop sticks, sandpaper, sponge rubber pads and other hand equipment.

These facilities line a room 22x40 feet in size, in the center of which are four very

A portion of the battery of grinding wheels in the Green Briar Lapidary Shop in the Green Briar Field House, where wheels ranging in coarseness from 80-grit to 400 are used to bring agate, jade, carnelian, and many other types of semi-precious gemstones from roughly sawed shapes to finished ones, ready for sanding, polishing and mounting into jewelry. In the foreground hobbyists are enameling copper ornaments.

rigidly constructed benches made of 4-inch thick lumber, bowling alley construction.

There are four of these benches 2½x9-feet in size, each having six positions, three on either side, with an individual gooseneck lamp suspended from an overhead rack for each position. This setup was originated by F. E. Kardes and Herbert Bart, technical supervisors for the Park District.

The students in class range in age from 14 to their high 70s and they represent all walks of life—teachers and office workers, artists, laborers, machinists, engineers, students and industrial executives—all finding a common interest in the hobby of gem cutting.

One woman had ground only a couple of stones before she created a pair of prize-winning amethyst and silver earrings. A young man started in the hobby while recuperating from polio in a hospital, came to the shop and was soon designing beautiful, original jewelry. A doctor told a man in his sixties he needed a hobby for his health's sake; and now he's making good things as a lapidary and feeling great. Sev-

eral of the older folks face retirement with more ease now that they have learned an enjoyable and rewarding way of keeping themselves occupied.

Generally they come to the shop one or two nights a week, bringing their own cutting materials or using some of the supply Thornton keeps available for their use. Usually he starts them off with one of the harder stones because they're less likely to ruin it, perhaps agate or jasper, grinding a simple oval cabochon. They're led through the various steps of cutting, with Thornton using diagrams to explain the different cuts. After they've mastered grinding, sanding and polishing, they progress to other materials, depending on their special interests.

Often they move on to silver work when they've completed enough stones to try varying the activity. In the same room they can manufacture silver and copper jewelry including exquisite enameled work.

From this beginning, many have amassed complete home shops. But on shop nights they still tend to drift down to Green Briar to work with the others, pick up a tip or so from Bert Thornton and use the fine equipment under his charge.

It's a place where a lot of people have learned to find a lot of enjoyment pursuing what they stoutly contend is the best hobby in the world.

CABOCHONS

By Wm. J. Bingham

The previous articles on the four basic lapidary processes apply to all phases of cabochon making and only the additional features will be discussed here.

The first operation in making cabochons is usually to saw the rough material into slabs, the thickness of the finished cabochon. If the rough material consists of

Instructor Bert Thornton demonstrates the proper technique for "Dopping" a stone to be polished to a stick so that it may be held against the grinding wheels, sanded and polished with greater ease. A special wax is melted in the pot. The stone is warmed on the same electrically heated iron that keeps the wax molten. Then the stick is dipped into the dopping wax, the wax shaped on the metal sheet in the right foreground and the stone is pressed firmly against it. After stone and wax cool the stick serves as a handle for the stone.

small pebbles or fragments, they can be ground directly to shape. The rough material should be carefully studied and cut so that the finished cabochon will have the best possible pattern.

Next is the determination of the size and shape desired. If possible all cabochons should be made to standard sizes and shapes so that standard mountings can be used. Common standard sizes are as follows: 20x15, 18x13, 16x12, 14x12, 14x10, 12x 10, 12x10, 10x8. All dimensions in millimeters and they apply to all shapes.

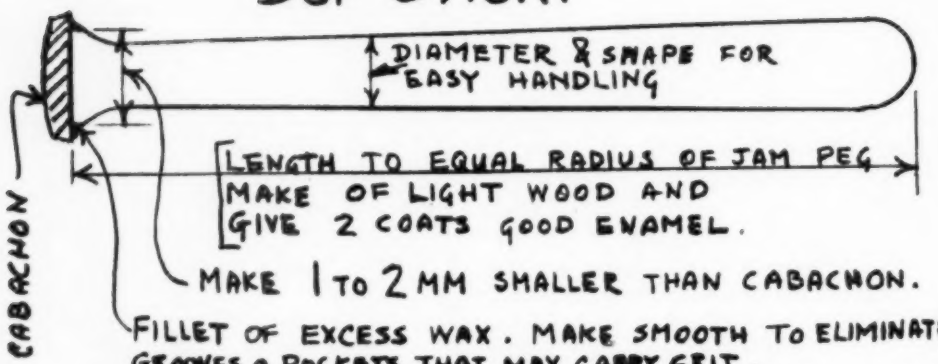
The easiest way to lay out a cabochon on a slab of material is to use a template and a sharpened piece of aluminum or brass wire to mark with. This marking should be made on what will be the back of the cabochon. Templates should be transparent material so that pattern and imperfections may be seen outside of the opening used. Old plastic frost shields (which are about 1/32" thick) make very good templates. The openings are made about ½ mm larger than the actual size desired so that the mark made on the slab will be approximately actual size. Considerable thought should be given to the relationship between the pattern in the stone and the size and shape of the cabochon, as a poorly oriented pattern can ruin the beauty of the gem.

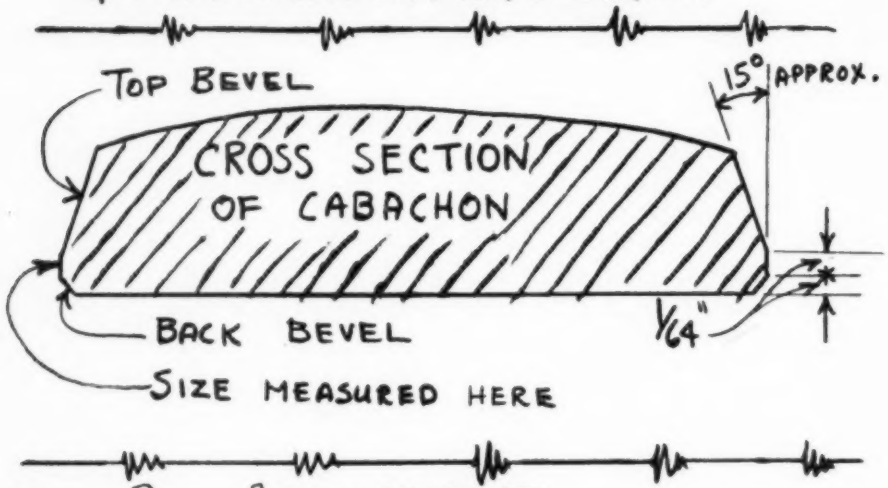
The next step is to saw the piece out of the slab, being careful not to saw too close to the marked outline—leave about ½ mm or more for grinding and sizing. This can be done either on a trim saw or a slabbing saw that has good true jaws on the clamp (to prevent breaking the slab.) Breaking up a slab with a pliers has been used but it is a very uncertain way of removing material and could easily break a very desirable cabochon. Sawing is just as fast and can be perfectly controlled.

Next is rough grinding—using the 80 grit wheel mentioned in Article 2. The cabochon is ground almost to the line marked on the back, leaving ¼ to ½ mm for finish sizing and the same amount over the top. The flat back is then smoothed on the smoothing wheel for flat surfaces described in Article 3, after which it is ready for dopping.

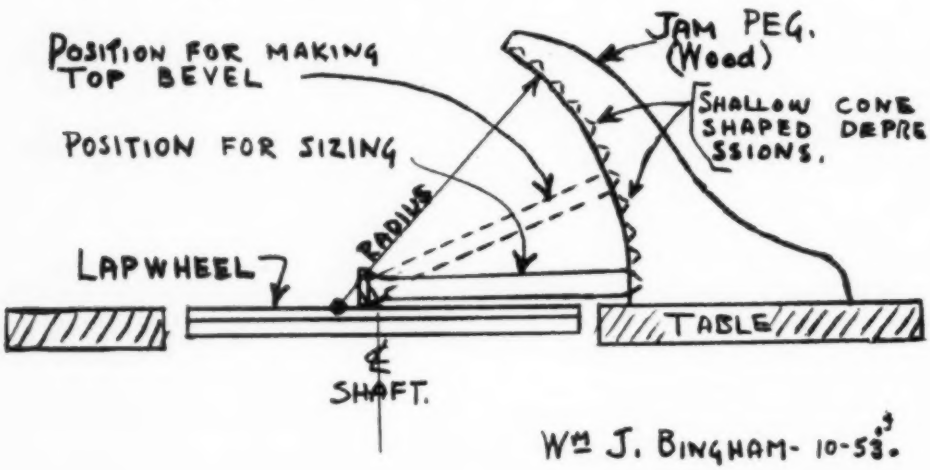
The dopping equipment required is — dop sticks, an alcohol lamp and the roughed out cabochons. A candle or *small* gas flame may be used instead of the alcohol lamp. The cabochons are placed bottom side up on the table or bench; the waxed end of the dop stick is held over the flame (using care

DOP STICK.





JAM PEG ARRARGEMENT.



Wm J. BINGHAM- 10-53.

that the wax does not boil or burn) until it is *slightly* softened. This is now placed on the back of a cabochon which will stick to the wax. Hold cabochon over flame until it is hot enough to melt the wax, then place cabochon on table and press stick down to squeeze out the excess wax. Then with wet fingers work the excess wax into a fillet between dop stick and back of cabochon, and set aside to cool. Always keep cabochon at least 2 inches from flame and keep it moving so that it will heat evenly and slowly. New dop sticks are coated with wax after which wax is only added when some is lost, or to replace some that has become contaminated with grit or polishing powder.

Dental impression wax (used wax can usually be obtained from your dentist for nothing) is the best wax I know of as it is very strong, sticks well to stones and has a low enough melting point so it can be worked and shaped with wet fingers without danger of burning. It also provides a safety indicator in that if the stone gets hot enough to melt the wax it indicates that something is being done wrong and should be corrected immediately. Sufficient coolant should be used at all stages to keep the stone *cold*.

The next operation after dopping is to bring the cabochon down to its final shape and size, using the arrangement mentioned in Article 3 for smoothing curved surfaces. The sizing is done with #220 silicon carbide coated cloth on the face plate. See sketch on page 36. This is followed by #400 and #600 smoothing operations and then it is ready for polishing. The finer scratches should always be at an angle to the coarser ones that are being removed. When the coarse scratches are gone, that step is finished!

The polishing procedure is fully covered in Article 4 on polishing.

To undop the stone it is held over the flame until the wax is *slightly* softened, then it is removed and the excess wax scraped off with a brass or soft metal knife and placed back on the end of the dop stick. The wax on the side of the dop stick is

softened and moved to the end where it will be in place ready for use next time.

The small back bevel is now ground on the cabochon holding it in the fingers. Small stones have to be redopped with the back up for this purpose.

After this is done the remaining wax, finger prints and, etc., can be removed with a cloth wet with alcohol, and the stone is finished.

Cabochons (or any gem stones) should not be stored in a box or container in such a manner that they will rub on each other. If they are not going to be mounted in jewelry immediately it is best to mount them on panels of convenient size. "Marlite" (a plastic coated masonite) is a good material and by using double sided scotch tape the cabochons can be removed and replaced easily.

The speed with which cabochons can be produced varies tremendously, but with the equipment and processes described in this and the previous four Articles, no cabochon of normal size should take longer than 30 minutes total working time. The total elapsed time will depend on how much talking and fussing time is put on it.

STUDIES IN COAL

(Continued from Page 23)

1678. He shared La Salle's passion for adventure and accompanied him on his mission to extend the scope of Joliet's exploration and secure the land for the French.

During the winter of 1680, La Salle established himself and party in a fort (Creve Coeur) built on the high bank of the Illinois River near Peoria. La Salle desiring to know more about the Upper Mississippi, detailed one Michael Accault and two associates, one of whom chanced to be Father Hennepin, to proceed down the Illinois River to its junction with the Mississippi and then to follow that river northward. The little party embarked in their canoes on Feb. 28, 1680, and all went well until on April 10th they met a fleet of canoes manned by a Sioux war party who took the Frenchmen prisoners and confiscated their property. The explorers were compelled to spend the winter with the Indians in their villages near Mille Lacs, but in the spring Hennepin and a companion were permitted to depart for the mouth of the Wisconsin River, where La Salle had promised to send supplies.

While this was going on Sieur Duluth and Daniel Grayloson had penetrated to the shores of Mille Lacs in the spring of 1679, but in the autumn returned to Lake Superior and followed the north shore to Pigeon River. There on the left bank of that stream, he built a trading post, on the site of what is now Fort William. This turned out to be the oldest permanent settlement in the state of Minnesota.

During the winter Duluth became dissatisfied with the discoveries of the previous summer and projected a journey to "the ocean of the West," which he believed to be not more than 20 days' journey distant. When the season of 1680 opened he set out with four Frenchmen and two Indian guides, ascended the Bois Brule River, portaged over to the St. Croix, and from thence to the Mississippi River. At this point he learned that a canoe with two Frenchmen had passed to the south a short time before, and after a few days of paddling they met a band of Sioux hunters and with them were the three Frenchmen, including, of course, Father Hennepin. All the Frenchmen now joined with the Indians and they returned to Mille Lacs.

The season was now well advanced, and Duluth had to forego his projected journey to the "ocean of the west," so they resolved to get out of the wilderness before winter closed down on them. A Sioux Chief furnished them with a rude but truthful map, and the eight Frenchmen departed for home by way of the Wisconsin River and Green Bay, and in due time they reached Fort Mackinac where the party broke up. Friar Hennepin forthwith returned to France and in 1682 published his "Description of Louisiana." He knew well how to tell an interesting tale, and formulated

such mixtures of truth and fiction, that even his contemporaries dubbed him "The Shameless Liar." Therefore it seems wise to discard any of Hennepin's claims for priority of discovery with the exception of the discovery of St. Anthony's Falls. No one has yet disputed his claim to that discovery.

WORLD'S DEEPEST HOLE!

Truly we are living in an age of superlatives. Few records ever remain tops for long. Things which yesterday were better, bigger, higher, lower, longer, faster, or "what have you," today soon become only the ordinary, outmoded in the swift march of events.

How well we remember the great thrill we got out of reading of man's remarkable feat, when for the first time he penetrated the earth's surface to the depth of more than a mile while searching for oil. Later we received an even greater thrill when we learned that at least three holes had been drilled into the earth three miles deep or more.

Now we hear of an exploratory well, drilled by the Ohio Oil Company in the Paloma Field, California breaking the old world's record of 20,522 feet and is now at a depth beyond the four mile level.

It yet remains to be seen if this wildcat operation, costing more than $1,500,000 will prove to be the source of oil awaiting discovery at these great depths previously unexplored.

It's such pioneering and risk-taking, spurred on by competition among thousands of privately managed oil businesses, that is responsible for the almost 33 billion barrels of proved "oil-in-the-ground" in this country, awaiting to be produced. Oil for tomorrow.

* * *

Ever notice how fast 'n furious the visiting collector and his host get to gabbing about their mutual interests? As if, any second, a hydrogen bomb should explode and bring an end to the conversation! Fun!

OFFICIAL ORGAN OF MIDWEST FEDERATION

MIDWEST CLUB NEWS*

Bernice Wienrank, Club Editor

WISCONSIN GEOLOGICAL SOCIETY will be host to the 1954 Midwest Federation Convention, to be held June 24-26, in the Milwaukee City Auditorium. WGS is one of the most enthusiastic organizations in the Midwest Federation and can be counted on to make this convention one of the best yet held.

MINNESOTA MINERAL CLUB on Dec. 12 heard Mrs. John Frohlicher, world traveler, speak on "Jewelry of Columbia." On display was Mrs. Frohlicher's valuable collection of Columbian jewelry and turquoise.

MMC's bulletin, *Rock Rustler's News*, edited by Ray Lulling, is gaining considerable renown because of the many original and excellent ideas contained in its "Lapidary Corner."

MARQUETTE GEOLOGISTS ASSOCIATION on Dec. 5 enjoyed some of its previous field trips anew via color movies. The trips which were screened included fossil collecting in nearby Wilmington and Lemont quarries (now flooded) and an agate hunt at Bellevue, Iowa.

MICHIGAN MINERALOGICAL SOCIETY's annual auction brought in $488. This impressive sum reflects the generosity of its members, many of whom donated material valued as high as $35. The average quality of mineral specimens and gem material on sale was high.

EVANSVILLE LAPIDARY SOCIETY witnessed on Oct. 31 the premier showing of an excellent new film, "A Diamond is Forever."

ELS was the subject of a fine feature story in the October issue of the *Indianapolis Star Magazine*. The article was well illustrated with workshop photographs of the club's members.

THE MINERALORIST SOCIETY OF JOLIET held their 23rd annual traditional Christmas Party and Tea on the evening of December 17th, in room No. 199 of the Joliet Township High School, which holds the distinction of being the earliest Earth Science Laboratory established in any of the secondary schools of America. Guest speaker of the evening was Mr. Sanford H. Gates, of Naperville, Illinois who spoke on the subject of Indian flint working, demonstrating his talk by actually making arrow points of various quartz minerals while all watched in astonishment.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS was addressed on Nov. 13 by Mr. Donald Collier, who is curator of South American Archeology and Ethnology for the Chicago Museum of Natural History. Mr. Collier spoke on "Empire Builders of the Andes" and illustrated his talk with magnificent colored slides of the Museum's official expedition to Peru. He also ex-

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**Societies are urged to send reports of their activities to this department, c/o Bernice Wienrank, 4717 N. Winthrop Ave., Chicago, Illinois. Will all Club Bulletin Editors please see personally that our Club Editor's name gets on their mailing list promptly.*

hibited many interesting artifacts which he collected while on that expedition. The meeting was attended by 250 people.

MIAMI VALLEY MINERAL AND GEM CLUB on Oct. 10 celebrated its first anniversary and elected Mr. Robert J. Wening its second president. The society meets the second Sunday of each month at 2:00 p.m. in the Y.M.C.A. Building, Fairborn, Ohio. Visitors are cordially invited.

PEBBLE PUPPIES is the name of the new society organized by the sixth grade pupils of Smouse School (Des Moines, Iowa) for the purpose of studying rocks and minerals. The club, modeled after the Central Iowa Mineral Society, has its own officers, constitution and by-laws.

CENTRAL IOWA MINERAL SOCIETY is making preparations for a mineral and gem show, to be held April 6-11 at Yonkers, Iowa. Plans include the construction of a large map showing mineral distributions throughout the U. S. A. and working exhibits of cabochon-cutting and faceting.

NEBRASKA MINERAL AND GEM CLUB heard on Sept. 16 a joint talk on Wyoming jade by members Charles Schwab and John Hufford. On display was a large map of Lander, Wyo., marked with the principal jade areas of that locale. At the end of the meeting, gem materials donated by John Bergstrom were distributed among the club's junior members.

INDEPENDENCE GEM AND MINERAL SOCIETY's exhibit of fossils, minerals and gems was the most popular feature of the Heart of America Hobby Show, held Oct. 17-18 in the Kansas City Auditorium. The interest shown by spectators indicates that IGAMS may expect an influx of new members.

CHICAGO LAPIDARY CLUB will on Jan. 7 hear Edward W. Hoyle, representative of the American Buff Co., speak on "Polishing Precious Metals." The club's display case will feature bragging-pieces.

MINNESOTA GEOLOGY SOCIETY announces the following schedule of lectures for its January and February meetings:

Jan. 12, "Geologic Mapping in the Copper-Nickel Prospect near Ely, Minn.," by Mr. Merle Harris.

Jan. 19, "Louis Agassiz and the Establishment of the Concept of Continental Glaciation," by Henry Sommers.

Jan. 26, "Revision of the Glacial History of Minnesota" by Dr. H. E. Wright.

Feb. 2, "Late Wisconsin Glacial History of the Little Falls Area," by Mr. A. F. Schneider.

Feb. 9, "History and Frost Features in the Eastern Portion of the Alaska Range," by Dr. H. E. Wright.

Feb. 16, "Wildlife Studies on an Arctic Trek," by Dr. W. J. Breckenridge.

Feb. 23, Glacial Geology and Geomorphology along the Back River, Northeastern Canada," by Mr. R. Taylor.

MGS meets each Tuesday at 7:30 p.m. in the Auditorium of the Minnesota Museum of Natural History, 17th Ave. and S.E. University Ave., Minneapolis. Visitors are welcome.

RECOMMENDED READINGS FROM SOCIETY BULLETINS

"Looking Back," by Harry Zollars, November issue of *The Voice*. A vivid account of the early days of amateur lapidary when mud saws were used to "wear" stones in two.

"Kaffir Boy," by Bill Pasman, December issue of *Rock Rustler's News*. The "inside" story of the Kaffir boys who work in the diamond mines of South Africa.

"Mineral Identity," by Dr. Frank Fleener, October and November issues of *Earth Science News*. Instructive for amateurs who wish to learn how to identify their own minerals. Part 1 discusses mineral hardness; part 2, the streak test.

"Corundum," by Don Sanders, November issue of *News Nuggets*. A comprehensive report on rubies and sapphires. Contains a list of rubies and sapphires of various colors which are distinctive of different localities.

NEWS OF OTHER SOCIETIES

BLUE MOUNTAIN GEM CLUB (La Grande, Ore.) on Nov. 23 heard member Mona Carlson give a brief account of temskay (petrified fern-wood) its great age and where it is found—among other places, in quantity at the Greenhorn Mountain location in Oregon. Other members displayed agate cabochons, petrified wood and pseudomorphs at the meeting.

COLORADO MINERAL SOCIETY, with the admission of Henry Aarnes, enrolled its 1000th member since the society was organized in 1936. Congratulations, CMS!

EL PASO ROCKHOUNDS meet the 2nd and 4th Thursday of each month at Texas Western College Museum. The first meeting is devoted to social activities and the second features an educational program. Visitors are welcome.

MIAMI MINERAL AND GEM SOCIETY (Florida) will be host to the 1954 convention of the Eastern Federation of Mineralogical and Geological Societies.

MINERALOGICAL SOCIETY OF PENNSYLVANIA held its first lapidary and silver-working meeting on Oct. 25. The fashioning of silver wire settings for baroque gems was the evening's project, successfully completed by all present.

YE OLD TIMER'S CLUB — GOING STRONG

When the history of the 20th century Earth Science revival is finally written, our good friend Paul VanderEike will stand out large as one of the Rockhound immortals of his day. His perseverance and genius in guiding the destinies of this now famous group of Old Timers, through the medium of his "OLD TIMER'S MINERAL BULLETIN", is little short of marvelous.

Punctually, once a month, comes this fine news letter packed full of most interesting reading and information concerning numerous personalities, what they are doing, what they are thinking,—exemplifying a way of life which has proven so satisfactory and helpful to so many of the "Old Timers" scattered far and wide throughout the country. The two pages of names of new members published in the December Bulletin, is ample proof of Paul's success and influence. He operates from Route 2, Box 1168, Vista, California.

YE OLD TIMERS' MINERAL CLUB's member George W. Smith of Fresno, Calif., owns what he believes to be the largest stone cutting saw in the United States. The blade of his saw is 4 feet 6 inches in diameter. Mr. Smith, who does not commercialize the output of his shop, uses his saw to cut large pieces of petrified wood, jade boulders, large thunder eggs, etc., "The stuff I cut is too big for anyone around here to polish," Mr. Smith explains. "Mostly I have to take it to a monument maker." Does anyone have knowledge of a larger saw?

MIDWEST FEDERATION MINERAL EXCHANGE

Midwest Rockhounds (and others) are missing a mighty good bet by not subscribing to the *Midwest Mineral Exchange Bulletin,* (officially sponsored by the Midwest Federation), which is published semi-occasionally by Exchange Director, Frank J. Sadilek, Editor, 1308 West 42nd Street, Des Moines 11, Iowa. All that is required to receive this valuable Bulletin is one thin dime per issue, mailed to the editor, which partially defrays the expense of the printing and mailing. *"Trade Wins"*, full of wit and repartee, by the editor, is thrown in for good measure. You simply can't afford to miss it.

The Exchange Bulletin publishes many names of folks who have minerals to exchange (or give away) for the asking, located all over the country. This is a venture in cooperative service afforded the members of the Midwest Federation, (and others) through the courtesy of Mr. Sadilek who serves without pay. It is people like Frank of whom it is said—"they are the salt of the Earth"—and not "old Salts" either.

CLASSIFIED ADVERTISING

Rate: Six Cents per word, per issue. Minimum, $1.00, payable in advance. No proofs or copies for checking are furnished. Introductory words will appear in CAPITALS. When additional capitalization is required, each such word counts as two words.

THE MINERAL COLLECTOR'S GUIDE to Wyoming is now available with maps, articles about interesting towns, parks, camping areas, etc. Special sections cover semi-precious stones, and unusual rocks and minerals, 25¢. GRITZNER'S, Mesa 4, Ariz.

FOSSILS — Belemites, Pachyteuthis Densus, 3 for $1.00. Mollusca; Gryphaea Mucronta, 3 for $1.00. No orders under $1.00. Postpaid in U. S. DON KNOWLES, 3906 Canal, Grandville, Mich.

GENUINE STAR SAPPHIRES, $1.00 per carat and up. We do all kinds of jewelry repair work, sizing, mounting, etc. B. LOWE, Holland Building, St. Louis 1, Mo.

WANTED—Will pay $1.00 each for copies of Earth Science Digest of August 1946, September 1946, March 1947; 50¢ each for October 1946, and December 1946; Sept.-Oct. 1947; and January 1949. EARTH SCIENCE DIGEST, Box 1357, Chicago 90.

MINERAL COLLECTION FOR SALE. 200 Specimens, some fossils and fluorescents, $50.00 GUILD, 630 Greenleaf Ave., Wilmette, Ill.

PONY BUTTE THUNDEREGGS from the original Priday Ranch in Central Oregon, $1.25 per pound, 5 pounds $5.00. HASTINGS TYPEWRITER CO., Hastings, Nebr.

"OVERLOOKED FORTUNES" in the rarer minerals! Find war minerals. Here are a few of the 40 or more you may be overlooking: Uranium, Vanadium, Columbium, Tantalum, Tungsten, Nickel, Cobalt, Tin, Molybdenum, Germanium, Platinum, Palladium, Bismuth, Titanium, Chromium, Antimony, Mercury, etc. Cassiterite now $1,000 a ton; Bismuth $1500 a ton; Columbite $2500 a ton; Tantalite $5000 a ton; Tungsten $3 a pound; Platinum $90 an ounce, etc. Now you can learn how to find, identify, and cash in on them. Send for FREE copy of "Overlooked Fortunes" it may lead to knowledge which may make you rich! DUKE'S RESEARCH LABORATORY, Box 666, Dept. C, Hot Springs, New Mexico.

WANTED—Carved cameo portraits of known persons. Send description, size, material, price. WILLEMS, Box 1515, Chicago 90.

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DENDRITIC OPAL (Kansas), good polishing stone, only $1.25 a pound. HASTINGS TYPEWRITER CO., Hastings, Nebr.

FOR MINERALIGHTS, GEIGER COUNTERS, LAPIDARY EQUIPMENT, BOOKS, THE GEODE "a friendly little mineral publication," right priced quality or Desert Adventure vacation, write to GRITZNER'S, Mesa 4, Ariz.

WILL SWAP fine Colorado petrified and agatized wood for lapidary equipment and supplies; assorted colors; sizes from ¼ pound to one ton. JAMES SCHERMERHORN, Castle Rock, Colo.

QUARTZ CRYSTALS. Unusual Canadian specimens. On approval. CLAUDE D. SMITH, Box 291, Geneva, N. Y.

U. S. GEOLOGICAL SURVEY BULLETINS, other publications, back numbers bought and sold. Also files of periodicals. J. S. CANNER & Co., Inc., Boston 19, Mass.

MOONSTONE CABOCHONS, Lapis Lazuli cabochons, Garnet cabochons in various sizes and colors are available. Interested parties contact M. VISHWEWAR, Postbox 3586, Bombay 4 (India).

THREE DOLLARS for ten cabinet size minerals every month. Pay postage after receiving minerals. A good way to start a collection and a cheap way to enlarge one. HOWARD B. GRAVES, 826 S. Ingraham, Lakeland, Fla.

BOOKS FOR COLLECTORS AND LAPIDARIES—Gem Trail Journal for your field trips, $2.00; Indian Silversmithing, an excellent work for lapidaries, $4.75; Dake's Gem Cutting, $2.00; English's Getting Acquainted With Minerals, $5.00; Dana-Hurlbut's Minerals and How to Study Them, $3.90. Ask for other titles. PAUL VANDEREIKE, Route 2, Box 1168, Vista, Calif.

GEOLOGY TEACHERS HONOR AUGUSTANA PROFESSOR

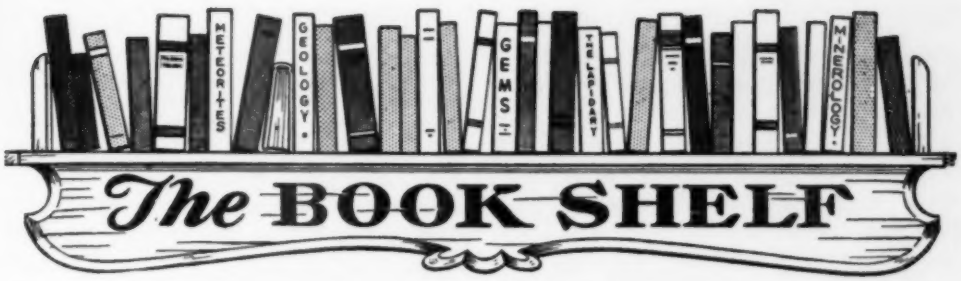
The Association of Geology Teachers, at its meeting held November 6, 1953 at the Royal York Hotel in Toronto, Canada, named Dr. Fritiof Fryxell the first medalist of the Neil Miner award of that organization. The Award was established last year to recognize meritorious accomplishment in stimulating interest in the earth sciences.

Dr. Fryxell is geology professor at Augustana College, Rock Island, Illinois, where he has been teaching since 1923. During most of this 30-year period, Dr. Fryxell maintained a "one-man department" at Augustana. A tribute to the effectiveness and stimulation of Dr. Fryxell as a geology teacher is the fact that during his teaching career over 100 young people have graduated from Augustana with degrees in geology. Most of these students did graduate work to the masters level and 26 have received or have nearly received the doctoral degree. This is a truly remarkable record for a small geology department.

In addition to his teaching duties, Dr. Fryxell has accomplished important research work in this country and abroad. During the Second World War he was Assistant Chief of the Military Geology Section of the U. S. Geological Survey. In 1944 he was sent to England to coordinate American and British terrain intelligence and in 1945 he was sent to Manila as Research Director of the technical staff which provided General MacArthur's Headquarters with terrain intelligence.

Dr. Fryxell has been president of the Association of Geology Teachers and the Illinois Academy of Science. He has served on various committees and commissions for these organizations and the Geological Society of America, The American Geological Institute, International Geological Congress, International Council of Museums, and the American-Scandinavian Foundation.

by H. D. Zuidema



The BOOK SHELF

ENERGY IN THE FUTURE — Palmer Cosslett Putnam, D. Van Nostrand Company, Inc., illus., 510 pp., $12.75.

This book presents a study of the problem: "Where can we find sources of low-cost energy in an abundance equal to the maximum plausible demands by the expanding and industrializing populations of the future?" The study was made under the auspices of the U. S. Atomic Energy Commission, and is focused on the specific question: "What is the maximum plausible role that nuclear fuels may be called on to play in the next 50 years or so?"

The author's systematic analysis of the problem includes a review of past population growths in a search for answers to the question: "Is population growth predictable?" Having concluded that it is not, he creates the device of a hypothetical Trustee of Energy, who then asks: "What are the maximum plausible populations of the next 50 to 100 years; and what are the maximum plausible demands for low-cost energy?"

The reserves of low-cost fossil fuels are reviewed to determine how long these "capital" reserves will meet the hypothetical demands. The "income" sources, principally sunlight, are then examined, to learn if we can hope to meet the bulk of future demands for energy from these sources at low cost.

The conclusion reached in each step of the study is based on an immense range of inquiry including much hard-to-get and hitherto unrelated material. Each conclusion will be of interest to every one concerned with planning for the contingencies of an uncertain future.

THE EARTH AND ITS MYSTERIES, G. W. Tyrrell, D.S.C., F.G.S., F.R.S.E., New York, British Book Center, Inc., 1953, $3.25.

This book written for beginners in the study of "Earth Science," however, is written so interestingly and covers such an amazing range of subjects, that many new points are brought out which would be of great interest even to an advanced student of the subject, professional geologist or mineralogist.

Starting with the origin of the Earth, it deals with the composition and origin of minerals and rocks which build the solid crust, and with the processes internal and external, which have shaped it. It presents facts and speculations regarding the nature of the interior, volcanoes, the effects of the winds, glaciers, the sea, geological work of rivers, living creatures, and the constructive and destructive work of man.

It tells of the effects of earth movements and earth-quakes, the origin of mountains, continental drift, radio-activity, and also discusses the probabilities as to the age of the Earth. For those who have studied and are familiar largely in the field of the American Continent, its structure and locations, this book will take you into far away countries and introduce you to a world-wide phenomena that is very refreshing, indeed.

AFRICA — A STUDY IN TROPICAL DEVELOPMENT—by L. Dudley Stamp. John Wiley & Sons, Inc., New York, 1953, 568 pages, $8.50, cloth bound.

In the light of present popular interest in underdeveloped areas and particularly

the continent of Africa, this book has come out at exactly the right time, but it is in no way a book hastily thrown together for his flair. It is a masterful work by one of the world's leading geographers and it is based on knowledge gained from his own work of many years, together with research into hundreds of references which are listed throughout its 28 chapters.

This book is profusely illustrated with maps, charts and pictures and is written in language that can be read, understood and enjoyed. It is a masterpiece of organization, starting with a brief but comprehensive discussion of the continent as a whole, passing on in an orderly fashion through dissertations on its map, its geological structure, its climates, its vegetations, its resources and its people and ending with a 14 page statistical summary and a 23 page index in which you can find any subject covered.

If for no other reason than to learn a few things about the discovery of America and why certain parts were originally colonized by the Spanish and other parts by the Portuguese, every American owes it to himself to read this book.

Earth scientists too, even the most learned, should read this book for it is hardly possible that any one would fail to learn from it, something which he did not previously know. This applies to every subject in the field.

As an addition to any library, private or public, this book is one which can be read, kept for reference and pointed to with pride of ownership. J.E.T.

CALLING ALL ROCKHOUNDS

The Arkansas Mineralogical Society, and the *Arkansas Gem, Mineral and Geological Society* will sponsor a Mineral Show at Hot Springs, Arkansas on January 23rd and 24th, 1954, which promises to be one of the big events of the present Midwinter Season.

This will be a fine chance for everyone to visit this "Crystal and Mineral Paradise," where the largest and finest collection of Quartz crystals ever shown in America will be on display. There will also be field trips to Magnet Cove, the Diamond Mines, Bauxite Mines and Crystal Mines given under competent supervision.

For further details and information write "Mineral Show" Route No. 1, Box 282, Hot Springs, Arkansas. This may be the the chance of a lifetime for all who go to get acquainted with that good old Southern hospitality.

NEW EARTH SCIENCE CLUB IN ALASKA

"The Alaska Rock and Mineral Association" is the name of the new Earth Science Club, recently formed at Kodiak, Alaska. The club members will be interested in corresponding with other Rock and Mineral Clubs in the States and also in trading specimens. Mr. George H. Cornelius, (Box 488, Kodiak, Alaska) who is the president of the new Club, states that he has all types of Alaskan rocks and minerals for sale, and that he and Mrs. Cornelius expect to expand their business extensively in the near future. We hope that this Club may affiliate early with one of the several Regional Federations in the States.

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